Railway Age

AND RAILWAY REVIEW

DAILY EDITION

FIRST HALF OF 1928, No. 24A — NEW YORK—WEDNESDAY, JUNE 20, 1928—ATLANTIC CITY — SEVENTY-THIRD YEAR

MINER

MAXIMUM EFFICIENCY
AT
MINIMUM COST

Radio telephone service for freight trains

Head-to-rear-end radio train communication for 125-car freight trains is General Electric's latest contribution to the railway industry.

Through the courtesy of the New York Central Railroad the locomotive radio telephone equipment has been installed on the Hudson type locomotive in the track exhibit at the Reading Terminal. A caboose equipment is on display at the General Electric exhibit, Booths 60, 62, 64, 66, 68, 70 and 72.

You are cordially invited to visit the locomotive and the G-E exhibit and to witness the demonstration of this radio train equipment.

"We've got a clear board. Call the flag. Let's go!"

521-4

GENERAL ELECTRIC

GENERAL ELECTRIC COMPANY, SCHENECTADY, N. Y., SALES OFFICES IN PRINCIPAL CITIES

Published Daily by Simmons-Boardman Pub. Co., 1309 Noble St., Philadelphia, Pa. Entered at the Post Office at Philadelphia, Pa., as second-class matter June 20, 1928, under Act of March 3, 1879.

20, 1928

S

521-4

C

CITIES

20, 1928,

JUN 23 1928
©CI B794316

Railway Age

DAILY EDITION

Copyright, 1928, by the Simmons-Boardman Publishing Company.

VOLUME 84 JUNE 20, 1928 NUMBER 24A

PUBLISHED DAILY EIGHT TIMES IN JUNE BY THE
SIMMONS-BOARDMAN PUBLISHING COMPANY,
1309 NOBLE STREET, PHILADELPHIA, PA., WITH EXECUTIVE OFFICES AT
30 CHURCH STREET, NEW YORK

EDWARD A. SIMMONS, *President* SAMUEL O. DUNN, *Vice-Pres.*
LUCIUS B. SHERMAN, *Vice-Pres.* CECIL R. MILLS, *Vice-Pres.*
HENRY LEE, *Vice-Pres. & Treas.* F. H. THOMPSON, *Vice-Pres.*
ROY V. WRIGHT, *Sec'y.*
CHICAGO: 105 WEST ADAMS ST. CLEVELAND: 6007 EUCLID AVE.
WASHINGTON: 17TH & H STS., N. W.
SAN FRANCISCO: 74 NEW MONTGOMERY ST.

EIDTORIAL STAFF

SAMUEL O. DUNN, *Editor*
ROY V. WRIGHT, *Managing Editor*

C. B. PECK, ALFRED G. OEHLER, J. G. LYNE, J. C. EMERY, D. A. STEEL, E. L. WOODWARD, H. C. WILCOX, R. C. AUGUR, C. J. CORSE, M. B. RICHARDSON, L. R. GURLEY, F. W. KRAEGER, H. P. FOSTER

BUSINESS DEPARTMENT REPRESENTATIVES

EDWARD A. SIMMONS, LUCIUS B. SHERMAN, HENRY LEE, CECIL R. MILLS, F. H. THOMPSON, GEORGE SLATE, F. C. KOCH, J. M. RUTHERFORD, J. G. LITTLE, R. E. THAYER, F. J. FISCHER, J. E. GOUGEON, J. E. ANDERSON, R. F. DUYSTERS, H. E. MCCANDLESS, C. PACKARD

Entered at the Post Office at Philadelphia, Pa., as mail matter of the second class.

The Railway Age is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

The Locomotive Appliance Exhibit

A STUDY of the exhibit of locomotive appliances reveals very few entirely new developments. However, the exhibit does show that the manufacturers have made remarkable strides in the refinement of their products with the object of reducing locomotive operating costs. The manufacturers fully realize that if they are to interest mechanical department officers in locomotive appliances, they must be in a position to prove that the savings to be effected will justify the expenditure involved. The trend in refinement has been to reduce maintenance costs and to incrase durability and locomotive efficiency. The effort to lower maintenance costs has been accomplished by reducing the number of parts, thus eliminating wearing surfaces which, of course, increases the life of a device. The elimination of connections and joints by combining several parts into one also contributes to the reduction of maintenance. Several appliances have been redesigned so that they can be repaired without removing other locomotive parts. Other appliances have been changed in order to reduce the time required for machining. A large number of devices have been redesigned to increase their durability. The developments in evidence on the pier indicate that the manufacturers of locomotive specialties are keeping step with locomotive designers in a combined effort to produce more powerful, more efficient, more reliable and more durable locomotives.

Tools for Reducing Out-of-Service Time

RAILROAD mechanical men, as they look over the exhibits, can hardly fail to be impressed by the great number of devices developed to handle an increasing variety of locomotive repair jobs. Experience in dealing with maintenance problems has driven home the fact that productive repair shop facilities must not only be well laid out with an adequate provision of the major facilities, such as machine tool equipment, but that in order properly to balance the entire operation, the problem of the minor machining operations and of material handling must be given some serious thought. This year's shop equipment exhibit offers an unusual opportunity to view the results of the remarkable development that has taken place in this field. A higher standard of locomotive maintenance has contributed immensely to greater mileage between shoppings, but in the attainment of that objective it is possible that due credit has not been given to the fact that within recent years manufacturers have placed at the disposal of the railroads facilities which now enable them to perform in a few hours repair jobs that, under former conditions, necessitated taking a locomotive out of service for several days or making repairs of a temporary nature until a general shopping could permanently remedy the trouble. With present-day equipment it is not such a difficult job to drop a pair of drivers, true up crank pins, rebore cylinders or valve chambers or change a set of rods or an air pump. The products exhibited by the shop equipment manufacturers have individually been dedicated to the important task of reducing the time a locomotive is out of service for repairs.

Making the Convention More Effective

THE business of conducting conventions, always one in which skill is required to insure the attainment of a full measure of benefit, is becoming more and more intricate as the subject matter to be covered grows in extent and becomes more technical in character. Not the least of the difficulties in the handling of present-day conventions is the result of the growth in the size of national organizations in this country. Convention audiences are now becoming so large that anyone but an experienced public speaker has great difficulty in making himself clearly heard by all in attendance. Nothing can more quickly dampen the spirit of a meeting than the inability of any part of the audience to hear clearly all that is said. Most of the younger members of any organization feel considerable diffidence in entering into the discussion of the committee reports, even under the best of conditions, and unless they can follow clearly all that has been said, they are at a great disadvantage in overcoming it. The younger men are not those who occupy the front seats. The arrangements which have been made for amplifiers in the Greek Temple this year will, therefore, be a source of satisfaction to all those attending the Mechanical Division convention. These arrangements have been carried even farther than the Greek Temple. A complete loud speaker system, with amplifying horns at various locations throughout the pier, may be connected with the microphone in the Greek Temple so that announcements may be made directly from the convention hall to all who are on the pier,

concerning the subjects as they come up for discussion. Without the microphone and loud speaker, no such complete co-ordination of the activities of a convention and exhibit covering as much ground as that which is opening this morning on the Million Dollar Pier would be possible.

Railways Developing Large Motor Coach Systems

SOME of the railways operating motor coaches have taken front rank among the largest companies operating motor vehicles for passengers on the highways. The Company operating the largest number of motor coaches is still the New York, New Haven & Hartford, whose motor coach operating subsidiary, the New England Transportation Company, has been a leader in this field for several years. The New Haven has 254 motor coaches now operating over 1,767 miles of routes. Although behind the New Haven in the number of motor coaches operated, the Great Northern, through its subsidiary, the Northland Transportation Company, is operating over a much larger highway system. With 133 motor coaches, the Northland is covering nearly 5,000 miles of motor coach routes. Next in size is the Boston & Maine, with 74 motor coaches operating over 981 miles of routes. The other large railway operators of motor coaches include the Southern Pacific, with 52 motor coaches and 1,312 miles of routes; the Union Pacific System, with approximately the same number of motor coaches; the Atchison, Topeka & Santa Fe, with 42 motor coaches; and the Spokane, Portland & Seattle, with 35 motor coaches. Other railways are coming along rapidly after these leaders, and it is not at all unlikely that the ranking will be somewhat changed before many months have passed.

Electric Drive For Cars and Locomotives

INCLUDED in the track exhibit are a 12-ton, gas-electric locomotive and a 148-ton Diesel-electric locomotive. There are also eleven rail cars of various types, all of which are equipped with one or more internal combustion engines and electric drive. The forms of drive employed can be divided into three general types, the operating characteristics of which are of general interest. The differential generator type supplanted manual control of the electrical equipment and has been in the field the longest of the three. It consists essentially of an engine-driven generator which supplies power for series motors geared to the axles. The generator has a differential winding which causes it automatically to supply the motors with approximately proper values of voltage and current at any car speed. Simplicity and dependability are the principal advantages claimed for this type of drive. A second type of drive disposes of the differential generator winding and in its stead employs a contact-making device called a torque governor. This device is actuated by the product of the current in the generator field and the current in the generator armature and will maintain full engine load at practically all car speed and full engine torque at all practical engine speeds. The control also provides for battery charging and air compressor operation at both running and idling speeds of the engine. Complete utilization of engine output and high efficiency are offered as features of this drive. A third type of drive has characteristics similar to those of the torque governor control, but differs in that generator field excitation is controlled by the action of the engine governor and the air compressor is mechanically driven. The exhibit provides the prospective purchaser of cars or locomotives with an opportunity to so familiarize himself with the three forms that he may select the one best suited to his particular requirements.

Business Prospects

IN the first issue of the *Daily* in 1924, and again in the first issue in 1926, we ventured to hazard predictions regarding railway traffic and earnings during the second half of each of those years. It happened that the prediction made in each case was justified by subsequent developments. In June, 1924, the railways had been experiencing a slump in traffic for some months. The opinion then expressed, that traffic and earnings would soon improve, was followed by an increase in freight business in the second half of 1924 that resulted in the railways earning in that year a total net operating income exceeding that of any preceding year since their return to private operation. In the early part of 1926 there was a sharp decline of prices in the stock market, which caused some apprehension regarding general business, but in the issue of the *Daily* for June 9th of that year we correctly anticipated that "in point of traffic and financial results, the entire year 1926 will be a better one for the railways than any previous year of the last decade."

Present conditions and trends seem to indicate what will be the general course of traffic and earnings during the rest of 1928. Experience over a period of several years indicates that at any given time freight car loadings for several months previously are the best barometer of railway business. Car loadings thus far in 1928 have been smaller than in either 1926 or 1927, and the Car Service Division of the American Railway Association has made a forecast that for the entire year they will be smaller than for either of the two years mentioned. This may prove to be correct, but the *Railway Age* ventures to predict that developments in the second half of 1928 will be similar to what they were in the second half of 1924.

In the latter part of 1923 traffic was showing a tendency to decline and in the first one-half of 1924 it was substantially less than in the first one-half of 1923. There was the same downward tendency in traffic in the second half of 1927 as there was in the second half of 1923, and this has been followed by the movement of a smaller freight business in the first half of 1928 than in the first half of 1927. We have believed for some time that in 1928, as in the case of 1924, the total volume of freight business would be comparatively small until midsummer or even later, but that, as in 1924, the trend of business during the second half of the year would be upward. We have as yet seen no reason for changing that opinion. Within some recent weeks car loadings have exceeded those of corresponding weeks in 1927, although they have not equaled those of 1926. We believe that in the fall and winter months, if not earlier, freight business will begin substantially to exceed that of last year.

To forecast business is a hazardous undertaking, but business history does tend to repeat itself. It has been very unusual for freight business in this country to register declines for more than twelve consecutive months. The population of the country is constantly

growing, and the public's productiveness and consuming capacity are constantly increasing. There always have been and always will be periods when the public, for one reason or another, will reduce its buying. But these periods have seldom lasted long, and there is no apparent reason for believing that they will last long in the future. The obvious decline in buying of commodities in general by the public, which has lasted now for an unusually long time, is bound to come to an end, and to be followed by a period of general activity in business, which will make railroad freight business again exceed all previous records. Just when the change will come nobody can accurately forecast, but it seems safe to assume that it will not be much longer postponed.

Old Rules for Proportioning Locomotives

IT was realized early in railroad history that the successful performance of a locomotive depended on properly balancing the boiler, cylinders and tractive force. However, it appears that the early designers placed more importance on the cylinders than on any other part or function. Evidence of this attitude of mind appears in a book entitled "Norris's Hand-Book for Locomotive Engineers and Machinists," which was written by Septimus Norris in 1854. We find, beginning page 234, that the author developed a simple method for designing a locomotive that any one possessing a little knowledge of algebra could readily use and apply. The only item on which the designer was required to use any originality or judgment was in making a decision as to the diameter of cylinders, which is D in the various formulas. From D the locomotive engineer or machinist could calculate the diameter of the boiler which the author has as $3.11 \times D$; the inside diameter of the steam dome, $1.43 \times D$; the diameter of the safety valve, $D \div 4$; the diameter of the stock, equal to D, the grate area, $5 \times D^2 \div 2$; the inside diameter of the nozzle top, $.017 \times D^2$; diameter of the side rod, $.21 \times D$, etc. Practically every part of a locomotive was proportioned to the diameter of the cylinders.

The author states further on in the book that he used these formulas in designing the "Philadelphia," a six-wheel locomotive which hauled a train of 158 coal cars with a load of 1,268 tons around curves having a radius of 750 feet at a speed of ten miles an hour. The "Philadelphia" had 42-in. diameter drivers and cylinders, 42½ in. by 22 in. This performance, he says, proved that his theory of locomotive design was correct. Of course, Mr. Norris's method of design is absurd, and was, even in 1854. But he had practically no test data or performance records to work with.

The proportioning of cylinders is as important to a locomotive today as in 1854 or as in Mr. Cole's time. The boiler of the modern locomotive, however, represents a vastly improved piece of apparatus, even as compared with that of Mr. Cole's time. Cole's basic ratios were the beginning of a new era in locomotive design and have been the foundation for most of the progress that has been made in recent years. However, further progress has been made, especially during the past five years, not only in the specialty field, but in the proportioning of the boiler itself. One has only to make a rough comparison of the modern locomotive, to types built as recently as 1910, to be convinced that there is need for the working out of a new set of standard basic ratios and proportions.

Today's Program

THE Purchases and Stores and the Mechanical Divisions of the American Railway Association will both hold the opening sessions of their annual conventions this morning.

Purchases and Stores Division

The Purchases and Stores Division meeting will be called to order in the Vernon Room of the Haddon Hall Hotel at 9 a. m. Daylight Saving Time, the session adjourning at 1.30 p. m.

9.00 a. m. Meeting called to order by Chairman.
Invocation.
Address by J. H. Waterman.
Address by R. H. Aishton, President, American Railway Association.
Address by W. G. Besler, First Vice-President, American Railway Association.
Address by Chairman.
Communications.
Appointment of Committees (Resolutions and Memorials).
Action on Minutes of 1927 Meeting.
Report of General Committee.
Subject 1—Stores Department Book of Rules.
Subject 2—Classification of Material.
Address by L. R. Fowell, Jr., President, Seaboard Air Line.
Subject 4—Provisions for Uniform Observance of General Balance Sheet Account 716—Material and Supplies, and Recommendations Governing Charges to Material Store Expenses, Paragraph 16 Special Instructions Operating Expenses.
Individual Paper—"Terminal Storekeeping," by E. H. Polk, District Storekeeper, Southern Pacific Company.
Subject 5—Forest Products.
Subject 10—Control of Material and Supplies Requirements.
Subject 6—Stores Department Buildings and Facilities for Handling Material (Other than road motor equipment and auxiliaries used in connection with same).

Mechanical Division

The Mechanical Division will meet in the Greek Temple on the Million Dollar Pier. The session will open at 9.30 a. m., Daylight Saving Time, and adjourn at 12.30 p. m.

9.30 a. m. Meeting Called to Order.
Invocation. Thos. S. Brock, Pastor, St. Paul's Methodist Episcopal Church, Atlantic City, N. J.
Welcome: Hon. A. M. Ruffer, Mayor of Atlantic City.
Address by R. H. Aishton, President, American Railway Association.
Address by Chairman.
Presentation of Past Chairman's Badge to L. K. Sillcox by F. W. Brazier.
Action on Minutes of 1927 Meeting.
Appointment of Committees on Subjects, Resolutions, Correspondence, etc.
Unfinished Business.
New Business.
Report of General Committee.
Discussions of Reports on:
Nominations.
Design of Shops and Terminals.

Entertainment

10.30 a. m. Orchestral Concert, Entrance Hall, Million Dollar Fier.

3.30 p. m, Orchestral Concert, Impromptu Dancing, Entrance Hall, Million Dollar Pier.

9.00 p. m. Informal Dance, Ball Room, Million Dollar Pier, Special Features, Jos. N. Ferko String Band, (Prize winners Philadelphia Mummers Parade), P. R. R. Keystone Quartette.

Members of the Executive Committee, Railway Supply Manufacturers' Association

1420D4

The R. S. M. A. Again Makes Good

Successfully overcomes handicap caused by delay in completion of Atlantic City's Convention Hall

THE steady and rather remarkable growth from convention to convention of the big exhibit at Atlantic City, which is associated with the meetings of the Mechanical Division and Purchases and Stores Division of the American Railway Association, has introduced many complicated problems, the solution of which has called for the greatest amount of ingenuity and hard work on the part of the officers and members of the Executive Committee of the Railway Supply Manufacturers' Association. Conditions have not been made any easier by the fact that the exhibit is now held biennially, instead of annually.

The difficulties in housing the big exhibit two years ago brought forth the promise on the part of the people at Atlantic City that a great Convention Hall would be available this year, with ample facilities for taking care of the entire exhibit and the convention meetings under one roof. It was not until late in the winter that it finally became evident that this structure could not be completed in time for the June conventions, and the officers of the Railway Supply Manufacturers' Association found themselves in a most embarrassing position. The problem was solved by an agreement on the part of the Atlantic City authorities to build an addition to the Million Dollar Pier, directly connected with it and paralleling the Boardwalk, which would supply ample space for this year's exhibit. It looked for a while as if even this building might not be completed in time, but the seemingly impossible was accomplished, and this morning finds the exhibit fully installed and everything in shipshape order.

W. H. S. Bateman
President of the Railway Supply Manufacturers' Association

While the handling of the exhibit forms a large part of the responsibility which must be shouldered by the R. S. M. A., it also has charge of the entertainment and recreation features, as well as the registration and enrollment; in addition it supervises the use of the rolling chairs.

R. S. M. A. Officers

The affairs of the Railway Supply Manufacturers' Association are looked after by the officers and members of the Executive Committee, the latter being carefully chosen from geographical districts.

W. H. S. Bateman, president of the association, has been attending the conventions for 30 years or more, and was doing active committee work in the days of Old Point Comfort and Saratoga. He has missed only one of the Atlantic City conventions since they were first held here in 1906 and has now served continuously on the executive committee for the third district for nine years. Mr. Bateman, familiary known as "Doc," because of being an alumnus of the Philadelphia College of Pharmacy and Science, is a native of New Jersey, having been born at Newfield, about 25 miles from Atlantic City, on June 3, 1868. After leaving college he went with what is now the Lukens Iron & Steel Company, specializing in railroad and industrial sales. Two years later, in 1895, he became general traveling sales agent. He went with the Chicago Pneumatic Tool Company in 1907, to look after its southern business. Since January, 1909, he has been general eastern and southern sales agent of the Champion Rivet Company, and district sales manager of the Parkesburg Iron Company for western New York, Pennsylvania, Ohio and the southern states east of the Mississippi.

In addition to his activities in the Railway Supply Manufacturers' Association, he was for 10 years secretary of the Associated Members of the American Boiler Manufacturers' Association, and he also served on the Executive Committee and as president of the Boiler Makers Supply Men's Association. He was a first lieutenant of Company C, 4th Battalion, Philadelphia Home Defense Reserves, during the World War and also during the same period was assistant chief of the Intelligence Bureau under the Philadelphia Police Department. Since the last conventions "Doc" has passed his examinations and has been commissioned a captain in the Engineer Reserve Corps, U. S. A.; he has been assigned to duty with the Philadelphia Engineer Procurement District as a chief

inspector under the command of Col. Charles D. Young, general purchasing agent of the Pennsylvania Railroad. He is a director of the Drovers' & Merchants' National Bank and a director of the Logan Bank & Trust Company of Philadelphia.

The Bateman family all have splendid convention attendance records. The two boys have been coming to Atlantic City with their mother since they were small

The Bateman Family—Left to Right: Stanley L ("Stan"), Mrs. Bateman ("Little Mother"), "Doc" W. H. S. Bateman, and T. Huston ("Tom")

tots. Stanley L. Bateman is now connected with H. T. Potts & Co. of Philadelphia, and Thomas, who is a graduate of the Baldwin Locomotive Works' special apprentice course, is attached to the engineering department of that company and is one of its representatives at this convention.

Gilbert E. Ryder, the vice-president of the R. S. M. A., is vice-president of the Superheater Company, and has been associated with that company for many years. He has been an indefatigable worker in the Railway Supply Manufacturers' Association and has served as chairman of some of its most important committees. He was, for instance, chairman of the Entertainment Committee in 1916, and chairman of the Exhibit Committee two years ago. He has also been active in the International Railway Supply Men's Association, which is associated with the International Railway Fuel Association.

The secretary-treasurer, John D. Conway, has functioned in this office for many years, and is also secretary of the Railway Club of Pittsburgh. "John" has his office at Pittsburgh, and painstakingly and effectively handles the multiplicity of details connected with the work of the association.

The Executive Committee

The Executive Committee includes, in addition to the president and vice-president, 13 members who are selected from eight geographical districts. The names of the members and the districts which they represent, follow:

First district (New England states) one member: Victor W. Ellet, Hunt-Spiller Manufacturing Corporation, South Boston, Mass.

Second district (New York and New Jersey) three members: Charles C. Castle, American Car & Foundry Motors Company, New York; Franklin H. Smith, Gold Car Heating & Lighting Company, Brooklyn, N. Y.; R. J. Himmelright, General Refractories Company, New York.

Third district (Pennsylvania) two members: Charles H. Gayetty, Boston Woven Hose & Rubber Company, Philadelphia, Pa.; S. G. Down, Westinghouse Air Brake Company, Wilmerding, Pa.

Fourth district (Ohio, Indiana and Michigan) two members: George T. Johnson, The Buckeye Steel Castings Company, Columbus, Ohio; W. E. Wine, Wine Railway Appliance Company, Toledo, Ohio.

Fifth district (Illinois) two members: H. E. Daniels, West Disinfecting Company, Railroad Department, Chicago; Norman C. Naylor, American Locomotive Company and Railway Steel-Spring Company, Chicago.

Sixth district (Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, Georgia, Florida, Alabama, Mississippi, Kentucky and Tennessee) one member: D. L. Eubank, Galena-Signal Oil Company, Atlanta, Ga.

Seventh district (states west of the Mississippi river, including Louisina, Minnesota and Wisconsin) one member: F. J. O'Brien, Globe Steel Tubes Company, Milwaukee, Wis.

Eighth district (Canada) one member: Arthur Allan, The Holden Company, Ltd., Montreal, Canada.

The terms of four of the members of the Executive Committee will expire September 1, 1928, and their successors must be elected at the annual meeting of the association, which will be held during this convention. The retiring members are Charles C. Castle, from the first district; S. G. Down, from the third district; George T. Johnson, from the fourth district; and Arthur Allan, from the eighth district.

Exhibit Committee

Comment on the work of this committee is hardly required—the big exhibit speaks for itself in no uncertain terms. Complete details concerning the exhibit will be found in another article in this issue. It has again reached record-breaking proportions.

The chairman of the committee is S. G. Down, of the Westinghouse Air Brake Company, and his associates, all of whom are drawn from the Executive Committee of the R. S. M. A., are H. E. Daniels, D. L. Eubank, R. J. Himmelright and George T. Johnson.

Enrollment Committee

First impressions of the convention on the part of many people are obtained from their experience at the enrollment desk. The members of the committee in charge of this work must greet and register promptly and correctly the members of the various associations and their guests. In addition to this responsibility the committee is also charged with the publication of the enrollment lists. The members of the committee are:

J. E. Brown, *Chairman*, Central Valve Mfg. Co., New York.
F. E. Dodson, *Vice-Chairman*, U. S. Rubber Company, Baltimore, Md.
W. C. Allen, Black & Decker Mfg. Co., Towson, Md.
H. L. Burrhus, H. L. Burrhus Co., New York.
C. L. Butler, Goodall Rubber Company, Chicago, Ill.
F. C. Davern, Nathan Mfg., New York.
W. H. Dickinson, Railway Purchases & Stores, New York.
A. B. Edge, Detroit Graphite Co., Atlanta, Ga.
G. Gregory, Oakite Products Co., Boston, Mass.

F. M. Hartley, National Lead Co., New York.
F. L. Johnson, Pressed Steel Car Co., Chicago, Ill.
H. B. Kirkland, Railway Purchases & Stores, Chicago, Ill.
F. C. Koch, Railway Age, New York.
J. E. Leonard, Pittsburgh Plate Glass Co., New York.
P. D. Mallay, Johns-Manville Co., New York.
H. H. Melville, Railway Age, Cleveland, Ohio.
P. B. Miller, Walworth Co., New York.
B. T. Moffatt, B. F. Goodrich Rubber Co., New York.
J. P. Murphy, Jr., Railway Purchases & Stores, Chicago, Ill.
C. A. Otto, Murphy Varnish Co., Newark, N. J.
P. E. Raymond, William Sellers & Co., Chicago, Ill.
A. D. Stuver, Gold Car Heating & Lighting Co., Chicago, Ill.
Philip Tarasi, Chicago Pneumatic Tool Co., New York.
M. K. Tate, Lima Locomotive Works, Lima, Ohio.
W. R. Van Steenburgh, Okonite Co., New York.
B. J. Wilson, Pocket List of Railroad Officials, Chicago, Ill.
Alexander Smith, MacRae's Blue Book, New York.

Entertainment Committee

The Entertainment Committee is charged with looking after the comfort and entertainment of the members and guests. It is something of a problem to vary the program from year to year, because of the large attendance at the various functions. This year the committee promises to include some new and unusual features which they feel will make a special appeal to the convention attendants.

For the first time this year the Entertainment Committee has a subcommittee in charge of bathing. It has arranged for both indoor and outdoor bathing at the Ambassador Hotel, including such things as beach chairs and umbrellas, a small fee being charged for the bathing privileges. The chairman of the Entertainment Committee vouches for the fact that the members of the subcommittee are all good swimmers and that they are determined to make a success of this innovation.

The members of the Entertainment Committee and its subcommittee in charge of bathing follow:

J. W. Fogg, *Chairman*, MacLean-Fogg Lock Nut Co., Chicago, Ill.
Chas. J. Nieman, *Vice-Chairman*, Penn Iron & Steel Co., Creighton, Pa.
J. H. Ainsworth, A. M. Byers Co., Pittsburgh, Pa.
S. L. Bateman, Philadelphia, Pa.
J. D. Brandon, American Arch Co., Inc., Chicago, Ill.
A. E. Biddle, H. Miner, Inc., Chicago, Ill.
Geo. W. Denyven, Geo. W. Denyven Co., Boston, Mass.
L. N. Devoe, Irving Iron Works Co., Long Island, N. Y.
H. J. Downes, American Locomotive Co., New York.
H. O. Fettinger, Ashton Valve Co., New York.
Geo. L. Gordon, Lukens Steel Co., Coatesville, Pa.
K. M. Hamilton, The Bettendorf Co., Chicago, Ill.
Cyrus J. Hankins, Wine Ry. Appliance Co., Washington, D. C.
George E. Hass, Pyle National Company, Chicago, Ill.
Oscar C. Hayward, Williams-Hayward Co., Chicago, Ill.
Chas M. Hoffman, Dearborn Chemical Co., Chicago, Ill.
F. B. Hartman, Hunt-Spiller Corp., So. Boston, Mass.
F. J. Horne, Johns-Manville, Inc., Philadelphia, Pa.
J. W. Hulson, Hulson Grate Co., Keokuk, Iowa.
Arthur G. Johnson, Armspear Mfg. Co., New York.
Irving H. Jones, The Central Alloy Steel Co., Massillon, Ohio.
W. B. Keys, Baldwin Loco. Works, Richmond, Va.
W. G. Krauser, Union Draft Gear Co., Montreal, Que., Canada.
Wm. T. Lane, Franklin Ry. Supply Co., Chicago, Ill.
E. Laterman, Champion Rivet Co., New York.
Chas. G. Learned, Chas. R. Long, Jr., Co., Yonkers, N. Y.
A. N. Lucas, The Oxweld Railroad Service, Chicago, Ill.
A. J. McDonald, Lebanon Steel Foundry, Lebanon, Pa.
Clarence S. Mellor, Barco Mfg. Co., Chicago, Ill.
L. K. Morrison, Galena Signal Oil Co., Atlanta, Ga.
G. M. Myers, Standard Stoker Co., Clarenden, Va.
John H. Murrian, The W. S. Murrian Co., Knoxville, Tenn.
L. J. McCombs, The Patterson-Sargent Co., Boston, Mass.
C. R. Naylor, Symington Co., Chicago, Ill.
N. C. Naylor, American Loco. Works, Chicago, Ill.
James R. New, Wm Sellers & Co., Atlanta, Ga.
Richard R. Paradies, The Arco Co., Cleveland, Ohio.
L. P. Pratt, American Car & Foundry Co., Philadelphia, Pa.
H. E. Passmore, McClave-Brooks Co., Pittsburgh, Pa.
Leslie R. Pyle, Locomotive Firebox Co., Chicago, Ill.
Lewis B. Rhodes, Vapor Car Heating Co., Washington, D. C.
Ralph R. Root, National Malleable & Steel Castings Co., Cleveland, Ohio.
W. Searls Rose, W. L. Brubaker & Bros. Co., New York.
J. L. Rowe, Chicago Pneumatic Tool Co., New York.
A. L. Roberts, The International Nickel Co., New York.
C. T. Ressler, Reading Iron Co., Reading, Pa.
F. E. Symons, Ralston Steel Car Co., Columbus, Ohio.
F. O. Schramm, Pressed Steel Car Co., New York.
K. F. Sheeran, Railway Purchases & Stores, Chicago, Ill.
W. H. Smaw, Electric Service Supplies Co., Atlanta, Ga.
C. W. Sullivan, The Goodyear Tire & Rubber Co., Chicago, Ill.
E. A. Thornwell, Railway Supplies, Atlanta, Ga.
Earl E. Thulin, The Duff Mfg. Co., Chicago, Ill.
R. P. Townsend, Johns-Manville Co., New York.
Fred W. Venton, Crane Company, Chicago, Ill.
Richard Welsh, Nathan Mfg. Co., Chicago, Ill.
S. B. Wight, Jr., Standard Steel Car Co., New York.
F. A. Wirth, Carbo-Oxygen Co., Pittsburgh, Pa.
Jos. R. Wetherald, Champion Rivet Co., Philadelphia, Pa.
S. A. Witt, Detroit Lubricator Co., Chicago, Ill.

Bathing Committee

Aage Birger Nilsen, *Chairman*, Sales Representative, F. K. Shults; Vice-President, MacLean-Fogg Lock Nut Co., New York.
Samuel F. Pryor, Jr., Southern Wheel Co., New York.
Wm. K. Graham, Griffin Wheel Co., New York.

George R. Boyce
Chairman, Transportation Committee

J. E. Brown
Chairman, Enrollment Committee

J. W. Fogg
Chairman, Entertainment Committee

J. P. Bourke, Ewald Iron Co., New York.
Bard Browne, The Superheater Co., New York.
C. L. Brown, Consolidated Ashcroft Hancock Co., Inc., Chicago, Ill.
C. R. Busch, Buffalo Brake Beam Co., New York.
J. A. Boyden, The Van Dorn Iron Works Co., Cleveland, Ohio.
C. Beaumont, MacLean-Fogg Lock Nut Co., Baltimore, Md.
John C. Campbell, Ulster Iron Works, Chicago, Ill.
L. A. Carpenter, Tousey Varnish Co., Chicago, Ill.
Frank C. Carter, Central Iron & Steel Co., Harrisburg, Pa.
J. J. Cizek, The Leslie Company, Lyndhurst, N. J.
Douglas R. Coleman, Worthington Pump & Machinery Corp., New York.
J. W. Coleman, Consolidated Equipment Co., Ltd., Montreal, Que., Canada.
J. H. Cooper, Pilliod Co., Chicago, Ill.
C. W. F. Coffin, Franklin Railway Supply Co., New York.
E. C. Daniels, West Disinfecting Co., Chicago, Ill.
Brownrigg L. Norton, Scullin Steel Co., New York.
Roy Lounsbury, Industrial Brownhoist Corp., New York.
H. D. Chamberlain, Tuco Product Corp., New York.
Arthur N. Dugan, National Bearing Metals Co., New York.
Fred Schramm, Pressed Steel Car Co., New York.
Wm. B. Johnson, representnig Ross F. Hayes, Railway Supplies, New York.
C. Beaumont, MacLean-Fogg Lock Nut Co., Baltimore, Md.
Harold B. Gardner, Westinghouse Air Brake Co., New York.

Transportation Committee

Convention attendants are entitled to the free use of rolling chairs during certain hours of the day. It is im-

portant that the members using these chairs wear their badges and that they be assigned to the chairs by members of the Transportation Committee. It has been reported that some of the pushers of the chairs which are retained for convention use, are inclined to pick up people not wearing badges and charge them the regular fee. The committee solicits the co-operation of convention attendants in helping to minimize these irregularities and to see that the best possible use of the chairs is made by those who are entitled to them.

This year the Transportation Committee will also have charge of the buses, which will run between the Million Dollar Pier and the track exhibit at Arkansas and Atlantic Avenues.

The names of the members of the committee follow:

Geo. R. Boyce, *Chairman*, A. M. Castle & Co., Chicago, Ill.
Ralph Brown, *Vice-Chairman*, Adams & Westlake Co., Chicago, Ill.
J. K. Aimer (Donald Charlton Alter), Reading Iron Co., Reading, Pa.
William Anderson, Pantasote Co., Chicago, Ill.
John Ash, Morris B. Brewster, Chicago, Ill.
C. C. Bailey, General Electric Co., Schenectady, N. Y.
John Baker, Locomotive Fire Box Co., Chicago, Ill.
W. F. Bauer, Edison Storage Battery Co., Chicago, Ill.
Chas. A. Beaumont, Wilson-Imperial Co., Newark, N. J.
Chas. H. Brown, MacLean-Fogg Lock Nut Co., Birmingham, Ala.
William L. Brown, Industrial Brownhoist Corp., Cleveland, Ohio.
R. B. Buram, Edna Brass Co., Cincinnati, Ohio.
W. S. Campbell, Jos. T. Ryerson & Son, Inc., New York.
Byard L. Clegg, Westinghouse Electric & Mfg. Co., New York.
Carl S. Clingman, Johns-Manville Co., St. Louis, Mo.
Geo. E. Coffey, Union Railway Equipment Co., Chicago, Ill.
T. J. Coolidge, Buckey Steel Castings Co., Chicago, Ill.
Clark Cooper, Jr., Clark Cooper, Philadelphia, Pa.
Champ Curry, Pullman Car & Mfg. Co., Chicago, Ill.
S. C. Dinsmore, The National Refining Co., Chicago, Ill.
Earl H. Fisher, The Wine Railway Appliance Co., Toledo, Ohio.
R. S. Folk, Bethlehem Steel Corp., New York.
R. F. Frehse, National Pneumatic Co., Chicago, Ill.
C. H. Gaskill, Baldwin Locomotive Works, Chicago, Ill.
R. S. Gay, The Timken-Detroit Axle Co., Chicago, Ill.
H. B. Gengenbach, Hale-Kilburn Co., Chicago, Ill.
H. V. Gigandet, Canadian Rys. Service Co., Ltd., Toronto, Canada.
E. F. Gladwell, Buffalo Brake Beam Co., Lackawanna, N. Y.
R. C. Grinnell, Acme Whiteland & Color Co., Detroit, Mich.
Fred N. Gundrum, Jr., E. I. DuPont de Nemours & Co., Chicago, Ill.
J. W. Hackett, The Okonite Co., New York.
O. B. Hanson, The Cleveland Twist Drill Co., New York.
F. C. Hasse, The Oxweld R. R. Service Co., Chicago, Ill.
A. J. Hawley, Galena Signal Oil Co., New York.
F. C. Heinen, Camel Sales Co., Chicago, Ill.
John Hutson, National Malleable Steel Casting Company, Cleveland, Ohio.
John H. Karow, Bassick Mfg. Co., Chicago, Ill.
John C. Keene, The Bradford Corp., Chicago, Ill.
W. H. Kinney, Dearborn Chemical Co., New York.
Harry Loeb, Lukens Steel Co., Contesville, Pa.
Geo. J. Martin, Union Asbestos & Rubber Co., Chicago, Ill.
J. C. Maxon, Graybar Electric Co., Philadelphia, Pa.
A. J. McDonald, Lebanon Steel Foundry Company, Lebanon, Pa.
J. A. McFarland, The Bird-Archer Co., St. Louis, Mo.
P. B. McGinnis, Westinghouse Friction Draft Gear Co., Chicago, Ill.
J. J. McMahon, American Car & Foundry Motors Co., New York.
Wm. S. Noble, The Rubberoid Co., New York.
C. C. Osterhout, Rome Iron Mills, Inc., Rome, N. Y.
R. T. Peabody, Air Reduction Sales Co., Chicago, Ill.
Arthur W. Preikschat, The National Lock-Washer Co., Chicago, Ill.
R. R. Porterfield, The Superheater Co., Chicago, Ill.
Philip H. Ryan, Manning, Maxwell & Moore, New York.
A. D. F. Simmons, Scully Steel & Iron Co., Chicago, Ill.
John Y. Sloan, Pullman Car & Mfg Corp., New York.
J. Soule Smith, Manning, Maxwell & Moore, Inc., St. Louis, Mo.
A. S. Taylor, Central Alloy Steel Corp., Chicago, Ill.
Louis F. Theurer, Pittsburgh Plate Glass Co., Chicago, Ill.
H. M. Van Sweringen, Chcago Railway Equipment Co., Chicago, Ill.
John H. Wallace, The Tyler Tube & Pipe Co., Washington, Pa.
Roy H. Weber, W. H. Miner, Inc., Chicago, Ill.
Charles F. Weil, American Brake Shoe & Foundry Co., Chicago, Ill.
Stephen M. Wells, Jr., The Gas Products Co., Cleveland, Ohio.
Richard Welsh, Nathan Manufacturing Co., Chicago, Ill.
E. E. Whitmore, The Adams & Westlake Co., Chicago, Ill.

Badge Committee

The Badge Committee has the responsibility of selecting the designs for the badges and seeing that a sufficient number are provided for each of the different classifications. The problem is not a simple or an easy one. This year the committee has taken special pains to insure that each individual who registers for the conventions will receive the correct badge, and that every convention attendant will know exactly what each badge represents. The Enrollment Committee has co-operated in this endeavor by preparing a two-page leaflet illustrating reproductions of each badge and indicating just who is entitled to receive them. These leaflets are being handed to each individual as he registers.

Franklin H. Smith is chairman of this committee, and his associate is N. C. Naylor.

The following table is a key to the badges which are illustrated in this article:

No.	*To Whom Badge will be Issued*	*Description*
1.	Members of the Mechanical Division	Royal Blue ground with white surprinting
2.	Members of P. & S. Division	White ground with blue surprinting
3.	Members of Motor Transport Division	Light blue ground with dark blue surprinting
4.	Members of the R. S. M. A.	Royal blue ground with white border
5.	Officers and Directors of the A. R. A.	Royal blue gruond with white surprinting
6.	Guests of the R. S. M. A.	White center with red border
7.	For special guests such as those affiliated with foreign railroads, the I. C. C. and government and state officers	Red with white border

No. 1 No. 2 No. 3 No. 4 No. 5

Badges for Convention Attendants—For Key See Table Under Badge Committee

No. 6 No. 7 No. 8 No. 9 No. 10 No. 11

Badges for Convention Attendants—For Key See Table Under Badge Committee

8.	Complimentary to the members of the Press, Atlantic City officials, hotel managers, etc.	Yellow ground with white border
9.	Ladies visiting with railroad men	Gold ground with light blue border
10.	Ladies accompanying the railway supply men	Gold ground with white border
11.	Ladies accompanying the men who receive the complimentary badge No. 8	Gold ground with yellow border

Other Committees

There are several other important committees, smaller in size than those above-mentioned, and made up entirely from the membership of the Executive Committee.

By-Laws Committee—This committee studies the progress of the association and from time to time makes suggestions as to improvements in the rules and by-laws. Arthur Allan is chairman of the committee, and his associate is W. E. Wine.

Hotel Committee—This committee maintains a contact with the Hotel Men's Organization in Atlantic City, keeping it fully informed as to the needs of the association and the visiting guests. It is also prepared to look after the interests of the convention attendants in cases of misunderstandings and complaints. The chairman of the committee is Charles C. Castle and associated with him is V. W. Ellet.

Finance Committee—Charles H. Gayetty is the sole member of this committee, which has to do with matters of finance.

Lost

Lost Badges 7133 and 7564—If found please return to the office of J. D. Conway, secretary-treasurer, R. S. M. A., or to the Enrollment Booth.

Reclamation Meeting

THERE will be a meeting of the Joint Reclamation Committee of the Mechanical Division and the Purchases and Stores Division on Monday, June 25, at 3:00 p. m., in the Club Room of the Hotel Traymore.

Canadian National in Market for Locomotives

THE Canadian National is asking for bids on eight or ten 2-10-4 type locomotives for service on the Central of Vermont.

Bathing

FOR the first time this year, special arrangements have been made for both indoor and surf bathing, under the direction of a sub-committee of the Entertainment Committee. The Ambassador Hotel facilities have been made available. The Bathing Committee, under the chairmanship of Aage Birger Nilsen, vice-president of the MacLean Fogg Lock Nut Company, is made up entirely of expert swimmers. The fee for bathing, including beach and pool, is $1.00, if you use your own bathing suit, or $1.50 if you use a hotel outfit. The use of the beach chairs is free.

Freight Equipment Ordered

The Erie Railroad has ordered 500 box cars from the Pressed Steel Car Company and 400 automobile cars from the Standard Steel Car Company.

Special Train From Chicago

THE Atlantic City convention special train over the Pennsylvania from Chicago ran in three sections of eleven cars each, carrying 450 passengers. In 1926 this train transported 452 passengers, and in 1924, 351 passengers. The departing time from Chicago was 1.10 p. m., Monday, arriving at Atlantic City, the "Realm of Relaxation," at 9.40 a. m. yesterday.

The run of the specials was fast and comfortable and was without particular incident. The equipment of the three sections was about the same for each section, namely, club cars, standard Pullmans, dining and observation cars.

Registration Hours

THE Enrollment Committee works in shifts and an attempt is being made to keep the registration booth open as much of the time as possible, to suit the convenience of the members of the various associations and their guests. So many requests come to us as to the exact time the enrollment booth will be open, that J. E. Brown, chairman of the Enrollment Committee, has suggested that we publish the following table, showing the periods that the Enrollment Committee will be on hand during the conventions.

WHEN THE ENROLLMENT BOOTH WILL BE OPEN

	Morning	*Afternoon*	*Evening*
Wednesday, June 20	9 to 1	2 to 6	7 to 8
Thursday, June 21	9 to 1	2 to 6	7 to 8
Friday, June 22	9 to 1	2 to 6	7 to 9
Saturday, June 23	9 to 12	2 to 5	7 to 9
Sunday, June 24	10 to 12	2 to 4	7 to 9
Monday, June 25	9 to 1	2 to 6	7 to 8
Tuesday, June 26	9 to 12	2 to 6	
Wednesday, June 27	9 to 11		

Rolling Chairs

THE Transportation Committee will provide rolling chairs for members and guests of the convention wearing official badges, from the following stations, between the hours indicated, from June 20 to June 27, inclusive:

	A.M.	P.M.
The Pier	9:00	to 6:30
Ambassador Hotel	9:00	to 6:00
Marlborough-Blenheim	9:00	to 6:00
Traymore	9:00	to 6:00
Chalfonte Hotel	9:00	to 6:00
Knickerbocker Hotel	9:00	to 6:00
Strand Hotel	9:00	to 6:00
	P.M.	P.M.
Grand Ball Evenings only	8:30	to 10.00

Unoccupied chairs may be stopped at any point on the Boardwalk, except between the Marlborough-Blenheim and the Pier, and they may be used in either direction.

Convention chairs are not allowed to wait more than fifteen minutes. The Transportation Committee will consider it a favor if members or guests of the associations will report any inattention on the part of an attendant. It will facilitate checking the complaint if the number on the chair is given.

Alexander Kearney Will be Missed

Member of General Committee and active worker for many years in the mechanical associations

MEMBERS of the Mechanical Division were greatly shocked to learn of the sudden death, on May 20, of Alexander Kearney, superintendent of motive power of the Norfolk & Western. Mr. Kearney was an enthusiastic horseman and death resulted from injuries received when he was thrown from his horse.

Mr. Kearney joined the Master Car Builders' Association in 1894. His first committee appointment was in 1903, on the Cast Iron Wheel Committee. In 1904 he was made chairman of the standing committee on the revision of rules for loading long material, and he served continuously on that committee until 1918, rendering a large service by his painstaking and critical attention to this rather complicated problem. In 1911 and 1912 he was a member of the executive committee. He served in 1909 on the Committee on Car Wheels, and was also, in 1911, a member of the special Committee on Revision of Constitution.

Mr. Kearney became a member of the American Railway Master Mechanics' Association in 1904. He was a member of the Committee on Flange Lubrication in 1911, a member of the Mechanical Stoker Committee in 1912, and from 1913 to 1918 was chairman of the latter committee.

When the American Railway Master Mechanics' Association and the Master Car Builders' Association were merged into Section III of the American Railroad Association in 1918, Mr. Kearney was appointed to serve on the General Committee. He remained a member of the General Committee when the organization became Division V of the American Railway Association, and has since served in that capacity and also as a member of the Committee on Electric Rolling Stock and of the Committee on Locomotive Design and Construction.

Alexander Kearney

Mr. Kearney did his work quietly, but effectively. His personality is very well summed up in the following statement which was made by one of the men who has been closely associated with him in his railroad work in recent years.

"Alexander Kearney loved his work. He was unusually efficient and an expert in his field; a pioneer who worked continually and persistently for shop improvement and progress in motive power. A keen student and analyst, a man of great practicability and one who always took a great interest in the mechanical associations of railroad men, Mr. Kearney was held in high regard by motive power officials throughout the country.

"He was enthusiastic in experimental research; a seeker after fundamentals. When something went wrong he searched until he found the cause. There were no half-way measures that would satisfy him. Loyalty, persistency and enthusiasm were his outstanding characteristics, and he required those things of the men who worked with him. In his years of work with the Norfolk & Western he built up an organization of men upon whom he could depend, all of whom were trained as experts and who had his same keen interest in their work.

"Mr. Kearney was a fine organizer, a good judge of men and a splendid mixer. His friends were from all walks of life. He was devoted to his employees, who greatly respected and had a warm affection for their chief. A man of dynamic energy and a conscientious worker, he expected results from his men and got them, though there was nothing of harshness or hardness about him.

"He had a sunny disposition and was a man of simplicity, though of great strength of character. He was a 'home' man and a devoted husband and father, and always had a cheery word of greeting for his neighbors. Naturally he took much interest in the growth of the city in which he lived.

"Mr. Kearney followed his own propensity for recreation. His favorite sports were horseback riding, fishing and hunting. He was an expert horseman and it was a rare thing for him to miss his daily ride. In season he was an ardent fisherman and hunter. Nothing expresses the man's friendliness and democracy more than the fact that he would take as his companion on a fishing or hunting trip an officer of the railroad and on the next trip a laborer in the shops. He was equally at home with all.

"Mr. Kearney was a descendent of General Phil Kearney, the well-known historical character of Indian fighting fame. He is survived by his widow and one daughter, eleven years old."

Alexander Kearney was born at Washington, D. C., October 24, 1869, and was educated at Georgetown University. He entered the service of the Pennsylvania Railroad at Altoona as a special apprentice in 1888, and steadily advanced in the mechanical department on that road until he became superintendent of motive power of

the Philadelphia, Wilmington and Baltimore division. In the fall of 1902 he became superintendent of motive power of the Baltimore & Ohio Lines, west of the Ohio river, remaining with that road in various capacities until April 1, 1905, when he became assistant superintendent of motive power of the Norfolk & Western at Roanoke. He was later made superintendent of motive power of that road, which position he held at the time of his death.

Telephone Service

TO call exhibitors, attendants at the convention should ask for Marine 9800. The telephone company has installed a number of booths in various parts of the exhibit and all calls will be relayed from the central booth to the one nearest the party called, from which a messenger will be sent to locate him.

Buses to Track Exhibit

BUSES to the track exhibit will leave the Pier on the even hour and every 15 minutes thereafter, going north on Arkansas Avenue to Atlantic, turning west to the driveway at the west end of Reading Station to unload; thence to Missouri Avenue, making a turn at the intersection; thence east on Atlantic Avenue to Pennsylvania Station, to unload and load.

They will return south on Atlantic Avenue to the Reading Station to load, leaving Reading Station at 5 minutes, 20 minutes, 35 minutes and 50 minutes past the hour, making the turn at Missouri Avenue and returning to the Pier.

The companies operating the buses will be the American Car & Foundry Motors Company, General Motors Truck Corporation, Mack International Motor Truck Corporation and the Twin Coach Company.

Registration, American Railway Association

Division V—Mechanical

Anderson, J. A., Shop Supt., C. M., S. P. & P., Shelburne
Anderson, R. W., S. M. P., C. M. & St. P & P., Marlboro
Askew, J. L., Paint For., S. A. L., Eastbourne
Ayers, A. R., G. M., N. Y. C. & S. L. Marlboro
Barnes, W. E., S. M. P., Can. Nat., Haddon Hall
Barton, D. E., Supt. Shops, A. T. & S. F., Brighton
Barry, F. J., M. M., N. Y. O. & W., Chalfonte
Bean, W. L., Mech. Mgr., N. Y. N. H. & H., Traymore
Bentley, H. T., Ret., G. S. M. P., C. & N. W., Marlboro
Bergstrom, H. E., G. M. I., N. P., Ritz-Carlton
Bilty, C. H., M. E., C. M. S. P. & P., Brighton
Brazier, F. W., Asst. to S. M. P. & R. S., N. Y. C., Marlboro
Brooks, C. E., Ch. M. P., Can. Nat., Haddon Hall
Browning, A. C., Asst. to Secy. Mech. Div., A. R. A., Ritz-Carlton
Burns, L. B., Asst. to Gen. Mgr., S. A. L., Ritz
Chambers, C. E., S. M. P. & E., C. R. R. of N. J., Dennis
Colligan, P. J., S. S., C. R. I. & P., Marlboro
Conniff, P. H., Asst. S. M. P. & M., F. E. C., Traymore
Crandall, W. J., M. M., N. Y. C., Dennis
Crimm, E. L., Asst. to G. M. S., N. P., Ritz-Carlton
Cuyler, G. W., M. M., C. R. I. & P., Traymore
Dailey, E. B., Eng. Car Const., So. Pac., Traymore
Deverell, A. C., Life, Standard Car Truck, Brighton
Dickson, John, S. M. P., S. P. & S., Ambassador
Donnelby, D. E., Ch. Elec., A. T. & S. F., Strand
Donovan, Henry, Insp. Car Rep., U. P., Strand
Draney, John, Engineman, D. L. & W., St. Charles
Dyer, R. H., G. C. I., N & W, Ritz-Carlton
Embury, W. B., S. M. P., C. R. I. & P., Marlboro
Endsley, Louis E., Univ. of Pittsburgh, Strand
English, W. M., M. M., Master Mechanic, Manon, Dennis
Ennis, J. E., Asst. Eng., N. Y. C., Ambassador
Farr, B. J., G. S. M. P. & C. E., G. T. W., Marlboro
Fetters, A. H., M. E., U. P., Ambassador
Fisher, C. D., Insp. of Mach., Penna., 331 Sewell Ave.
George, W. A., M. M., Jacksonville Term., Dennis
Goodnow, T. H., Life, Marlboro
Goodwin, Geo., Asst. Gen'l S. M. P., C. R. I. & P., Chalfonte
Griffith, W. G., M. M., P. M., Dennis
Hall, James, M. C. R. T. P., So. Pac., Haddon Hall
Hankins, F. W., Ch. of M. P., Penna., Marlborough
Harper, H. L., Asst. M. M., L. N. E.
Harris, H. T., Ch. A. R. A. Clk., D. & R. G. W., Brighton
Harrison, W. R., M. M., A. T. & S. F., Traymore
Haskell, B., Life, Haddon Hall
Hawthorne, V. R., Secy. Mech. Div., A. R. A., Ritz-Carlton
Henley, R. G., S. M. P., N. & W., Ritz
Hennessy, H. J., Ch. Drafts., N. P., Ritz-Carlton
Hentz, A. G., M. M., N. Y. C., Ritz
Herrigan, J. T., S. M. P., C. J. & E., Traymore
Hicks, I. C., Mech. Supt., A. T. & S. F., Knickerbocker
Hinckley, A. C., S. of M. P. & M., U. P. O. S. L., Chalfonte
Hoppe, A. G., Eng. of Tests, C. M. St. P. & P., Breakers
Hudson, T. C., Asst. G. S. M. P., Can. Nat., Seaside
Hyde, R. C., M. M., C. R. I. & P., Strand
Irwin, J. E., M. M., Sand Springs, Princess
Jackson, O. S., S. M. P. & M., U. P., Traymore
Jennings, J. F., S. M. P., Mich. Cent., Dennis
Jones, E. S., G. C. I., B. & A., Pennhurst
Johnson, H. W., S. Mp. & R. S., M. & St. L., Marlboro
Johnston, W. A., Gen. Car For., U. P., Brighton
Jumper, F. J., Insp. Eng., U. P., Ambassador
Kerwin, J. M., M. M., C. R. I. & P. Ry., Strand
Kinniard, L. S., S. M. P., C. E. I., Traymore
Kirkby, T. M., Mech. Engr., M. K. T., Traymore
Koyl, C. H., Eng. Water Serv., C. M. & St. P., Traymore
Kleine, R. L., Asst. Ch. of M. P., Penna.
Laughlin, Geo. E., G. S. S., Armour Car Lines, Marlboro
Lewis, B. N., M. S., M. S. P. & S. S. M., Traymore
Lister, F. G., Ch. M. E., S. L. & S. F., Ritz-Carlton
Long, J. F., S. M. P. & M., U. P., Traymore
Love, C. D., Asst. M. M., L. & N., Ritz
Love, Dumont, S. A. B., F. E. C.
Machesney, A. G., Sales Eng., Cornwall, Traymore
Meadows, C. C., M. C. B., Tidal Companies
Moore, B. R., S. M. P., D. & I. R., Traymore
Morris, J. P., M. M., A. T. & S. F., Chalfonte
Mosley, W. S., Mech. Eng., C. C. & O., Chalfonte
McAlpine, J. H., S. M. P. & C. E., Can. Nat., Seaside
McAmis, W. H., S. S., M. P., Strand
McCarthy, T. W., S. M. P., C. R. I. & P., Marlboro
McCormick, Geo. W., G. S. M. P., S. P., Marlboro
McQuillen, J. E., Mech. Supt. G. C. & S. F., Chalfonte
O'Neill, W. J., G. M. S., D. & R. G. W., Ambassador
Nelson, C. J., Ch. Int. Insp., Chicago, Ritz Carlton
Nicholson, J. M., Fuel Cons. Eng., A. T. & S. F., Dennis
Nimmo, J. K., M. M., A. T. & S. F., Knickerbocker
Painter, J. H., M. M., A. C. L., Chalfonte
Peck, C. E., S. M. P. & W., U. P. Traymore
Phelps, B. P., Eng. Shops, A. T. & S. F., Shelburne
Pownall, W. A., Mech. Eng., Wabash, Traymore
Purcell, John., Asst. to V. P., A. T. & S. F., Marlboro
Ramsdell, T. M., M. C. B., U. P., Chalfonte
Raps, J. F., Gen. Loco. & Boiler Insp., Penna., Traymore
Riccius, H. E., D. M. M., C. M. St. P. & P., Dennis
Richardson, L. A., G. S. M., C. R. I. & P., Marlboro
Ripley, C. T., Ch. M. E., A. T. & S. F., Ritz Carlton
Roesch, F. P., Sales Mgr., Standard Stoker Co., Inc., Dennis
Ruiter, A. R., M. M., C. R. I. & P., Strand
Seddon, C. W., S. M. P., D. M. & N., Traymore
Seley, C. A., Cons. Eng., Loco. Fire Box Co., Chalfonte
Sheeby, J. Fred, Pres. G. M., C. S. L., Shelburne
Sheridan, T. F., C. C. to S. M. P., P. & L. E., Strand
Shreeve, J. C., M. M., E. J. & E., Chelsea
Skinner, A., G. S. F., A. T. & S. F., Shoreham
Smart, Geo. E., Ch. of Car Equip., Can. Nat. Rys., Marlborough
Smith, R. P., M. E., A. & W. P., Ritz Carlton
Smith, E. S., M. C. B., F. E. C., Ambassador
Smith, B. H., M. M., C. R. I. & P., Strand
Street, Clement F., Con. Eng., American Steel Foundries, Marlboro
Stremmel, F. H., Asst. to Secy. Mech. Div., A. R. A., Ritz Carlton
Sullivan, J. J., S. M. P., N. C. & S. L., Marlboro
Trumbull, A. G., Ch. Mech. Eng., Erie, Traymore
Van Briner, Geo., Gen. Supt., Colo & Wyo., Brighton
Von Bergen, E., Gen. A. B. & C. H. Eng., I. C., Traymore
Wanamaker, E., E. E., C. R. I. & P., Chalfonte
Wheeler, C. A., M. M., C. P. R., Strand
Wildin, Geo. W., Chalfonte
Williams, Frank, M. E., Can. Nat., Haddon Hall
Winter, P. G., Sp. Asst., Am. R. Assn., Ritz Carlton
Worman, H. L., S. M. P., St. L. & S. F., Traymore
Wright, Roy V., Man. Edt., Railway Age, Dennis
Wymer, Chas. J., S. C. D., C. & E. I., Traymore
Zwicht, Silas, G. M. S., N. P., Traymore

Division VI—Purchases and Stores

Alexander, G .W., Gen Stk., C. of Ga., Ritz
Allan, Donald B., Recl. Insp., U. P., Ambassador
Argyle, Chas. S., Dis. Stk., Can. Nat., Chalfonte
Barker, Geo., Gen Stk., F. W. & D. C., Ritz Carlton
Bennett, J. L., P. A., Cent. of Ga., Marlboro
Berney, P. H., Insp. of Stores, C. R. I. & P., Strand
Blanchard, Frank, Jr., Stat. Stk., B. & O., Ambassador
Bon, I. C., Supt. Scrap & Recl., Wabash, Strand
Brain, B. B., P. A., K. C. S., Shelburne
Burton, F. A., Div. Stk., Nor. Pac., Haddon Hall
Corbett, J. W., P. A., Can. Nat., Ritz Carlton
Corcoran, D. W., Gen'l Stk., C. & N. W., Haddon Hall
Culver, W. R., Gen. Stk., P. M., Ambassador
Davidson, W., Gen. Stk., I. C., Traymore
Dittae, W. P., Ret. P. A., N. Y. C. & St. L., Shelbourne
Donagan, C. A., Gen. Stk., B. & M., Haddon Hall
Gable, R. J., Div. Stk., I. C., Shelburne
Gordon, W. B., Asst. Gen. Stk., Can. Nat., Seaside
Hyatt, L. V., Supv. Mat. Stand., Mo. Pac., Shelbourne
Hunter, Percival, Asst. P. A., C. B. & Q., Marlboro
Hunker, W. L., Div. Stk., C. R. I. & P., Strand
Hughes, E. H., Gen. Stk., K. C. S., Shelburne
Howard, W. J., Cl. Stores Cat. Dept., Penna., Barton
Hopkins, W. A., Gen. P. A., Mo. Pac., Marlboro
Hopkins, J. C., Div. Stk., I. G. N., Strand
Hoffman, L. T., Trav. Stk., U. P., Traymore

The "President Cleveland"—Equipped With Water-tube Firebox and Caprotti Valve Gear

Track Exhibits of Locomotives Shown at Two Points

Steam, internal combustion and electric locomotives are fine examples of large and efficient modern power

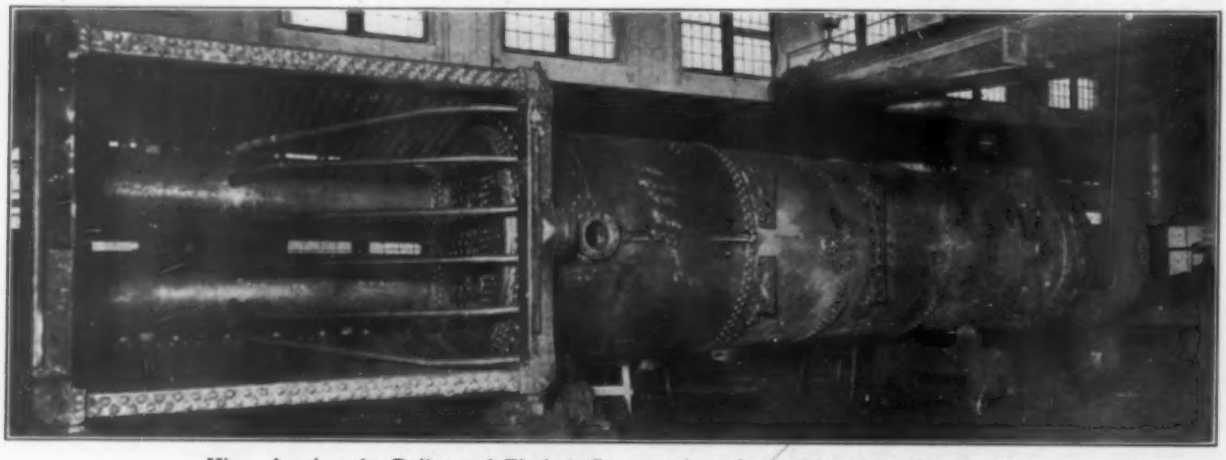
THE locomotive track exhibits this year are the largest, and probably the most interesting, of those at any Atlantic City convention. As far as possible these exhibits have been concentrated on the tracks of the Reading Company in the enclosure of the station and yards, extending from Atlantic and Arkansas avenues as far as Baltic avenue. The arrangements have been under the supervision of the Exhibit Committee and buses will be operated to and from the pier to the track exhibits on a regular schedule maintained under the supervision of the Transportation Committee.

Supplementing the exhibits on the tracks of the Reading Company are the exhibits of the Pennsylvania Railroad on the tracks near its Tennessee avenue station at South Carolina avenue. These exhibits include steam locomotives, Class K4s and M1; and electric locomotive, and a number of rail-motor and other cars.

The five steam locomotives on the Reading tracks include the Baltimore & Ohio Pacific type locomotive, President Cleveland; the New York Central Hudson type locomotive No. 5216; Baldwin locomotive No. 60,000, a three-cylinder compound of the 4-10-2 type; a Union Pacific locomotive, No. 9015, of the three-cylinder 4-12-2 type, and a Texas & Pacific locomotive of the 2-10-4 type. Another feature of this exhibit is a Commonwealth combined locomotive bed and cylinder casting. Internal combustion locomotives and cars will also be found on these tracks.

Baltimore & Ohio Exhibits "President Cleveland" with Caprotti Valve Gear

Several novel features, such as a water-tube firebox, Caprotti valve gear, and water-bottom tank, have been incorporated into the design of the Baltimore & Ohio's Pacific 4-6-2 type locomotive No. 5320, better known as the "President Cleveland." As in the others of its "president class" of locomotives, particular care has been exercised in the design to make the lines of the locomotive as smooth and pleasing to the eye as possible. To one familiar with British locomotives, a marked resemblance in lines and finish will at once be apparent. The air compressor is located between the frames, back of the main drivers, the headlight generator is on the rear deck on the left side, convenient for adjustment from the



View showing the Boiler and Firebox Construction of the "President Cleveland"

ground. The piping, as far as possible, has been suspended from the running boards and the air pipes and a number of other pipes are welded to eliminate screwed joints. The exhaust steam pipe to the Elesco exhaust steam injector is placed between the frames and is carried through the ash pan, at the rear of the locomotive.

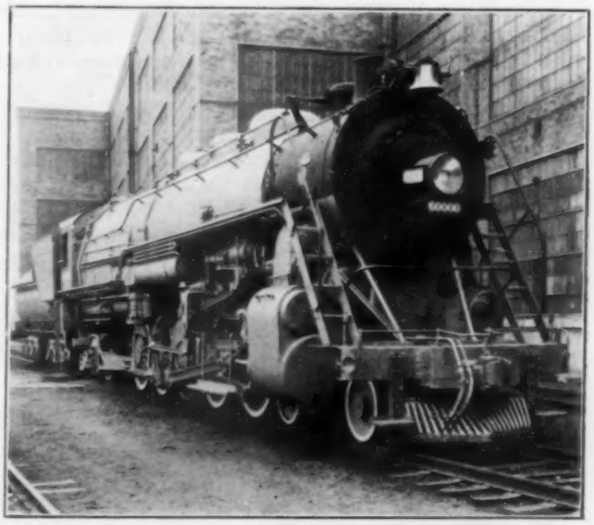
The locomotive develops a tractive force of 50,000 lb. which, with the weight on the drivers of 203,500 lb., makes a factor of adhesion of 4.07. The diameter of the drivers is 80 in. and the boiler operates at a pressure of 230 lb. per sq. in. The cylinders are 27 in. by 28 in. The total weight of the engine is 329,500 lb., of which 62,000 lb. is on the engine truck and 64,000 lb. carried on the trailer truck. It has a total wheel base of 37 ft. 1 in. and a rigid wheel base of 14 ft. The tender has a bunker capacity of 17½ ton and a water capacity of 12,000 gal. The total loaded weight of the tender is 240,000 lb.

The water-tube firebox has a length of 120. in. and a width of 84 in. with a grate area of 70 sq. ft. It has two longitudinal drums at the top, 30 in. in diameter and two top and bottom longitudinal headers 7½ in. square. The top headers are connected to the top drums by seven 4-in. circulating tubes on each side. The bottom header, which forms the firebox frame, is connected to the barrel by one connection 9 in. in diameter at the center.

These top and bottom headers are connected together with two rows of 2½-in. diameter vertical tubes, these tubes forming the sides of the firebox. Opposite each vertical tube in the top and bottom headers are plugs which are used for applying and rolling in the vertical tubes. In addition, the vertical tubes can be turbined at washout periods only by the removal of the top plugs. The novel feature of the firebox is that all the tubes can be applied and rolled, and the entire boiler cleaned without necessity of a workman having to get inside of the drums. It takes approximately 4½ hours to completely wash-out and clean the boiler and turbine the side tubes. There are no staybolts in the boiler.

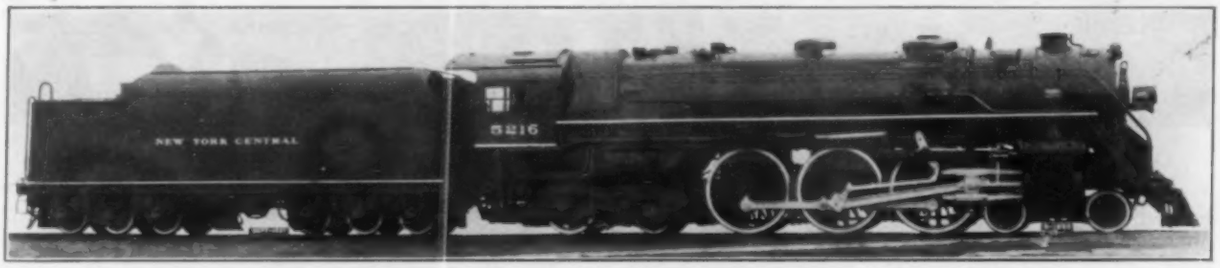
The total saturated steam heating surface of the boiler is 4,595 sq. ft. This, with the superheating surface of 1,188 sq. ft., gives a combined heating surface of 5,783 sq. ft. The boiler has 205, 2¼-in. tubes and 40, 5½-in. flues. In addition to the features already mentioned, the locomotive is equipped with a Standard stoker, Type BK; a screw reverse gear, and B. & O. type superheater.

The President Cleveland was built at the Mt. Clare,



Baldwin Compound Locomotive No. 60,000

Md., shops and was given a careful dynamometer road test the first of this month. It will be interesting to note that the Caprotti valve gear used on this locomotive has been in continuous service on a Baltimore & Ohio 2-8-0 type locomotive, No. 2722, for about 15 months, before it was applied to the President Cleveland.

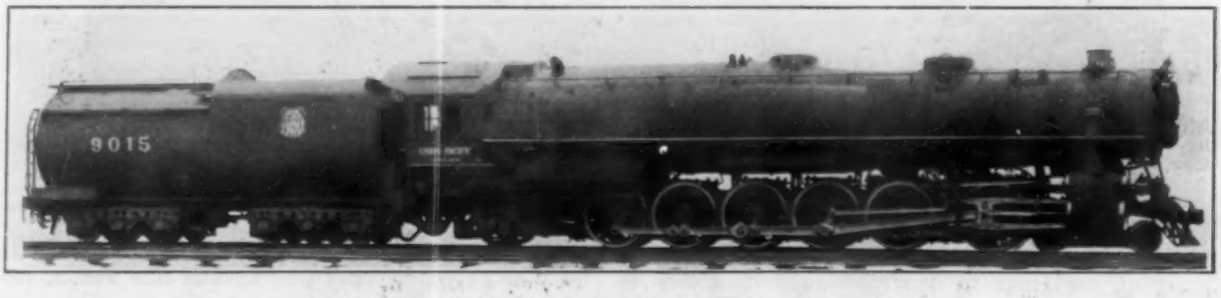


New York Central Locomotive of the Hudson Type

The table shows the average results obatined from tests on the eastbound and westbound trips run during the first part of June, 1928, between Keyser, W. Va., and Brunswick, Md., over the Cumberland division, eastern lines.

The New York Central Hudson Type

One of the exhibits at the Reading Terminal is New York Central locomotive No. 5216. This is one of the Hudson type locomotives, the first of which, the No. 5200, was delivered in February, 1927, by the American



The Union Pacific 4-12-2 Type at the Reading Terminal

Locomotive Company. It represents a development from the Pacific type locomotive for the purpose of securing increased boiler capacity and greater horsepower output to meet the growing demands of high speed passenger service. The locomotive has a four-wheel trailing truck and a well-proportioned boiler of high capacity, with a grate area of 81.5 sq. ft. It is equipped with a Type E superheater, a Coffin feedwater heater, located inside the smoke box with Okadee front end hinges, a locomotive pilot valve, general Railway Signal train control and trailer booster. It has a total evaporative heating surface of 4,491 sq. ft. and a superheating surface of 1,965 sq. ft., giving a combined heating surface of 6,456 sq. ft. The cylinders are 25 in. by 28 in. and the locomotive carries 225 lb. boiler pressure. The total weight of the locomotive is 343,000 lb., of which 182,000 lb. is on the drivers.

A further interesting feature of this locomotive is the fact that it is equipped with a locomotive cab-to-caboose radio communication.

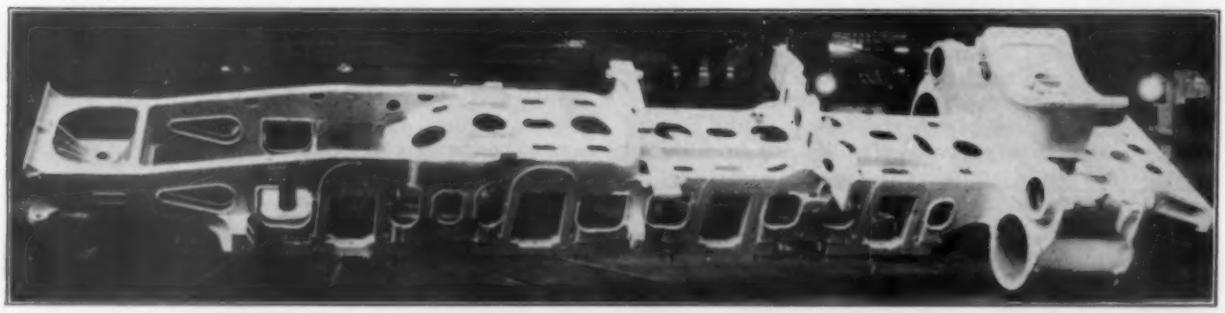
Table Showing the Average Results Obtained from Road Tests with the "President Cleveland"

Direction	East Bound		West Bound
Coal per drawbar hp. hr., lb.	2.41		2.91
Coal per 100 ton-miles, lb.	3.83		12.28
Coal per sq. ft. grate per hr., lb.	42.22		58.71
Water per lb. coal, lb.	7.50		7.35
From and at 212 deg. F.	8.79		8.62
Steam per drawbar hp. hr., lb.	19.59		22.09
Average hp.	1,225		1,411
Average drawbar pull, lb.	19,082		20,736
On low grade	39	min.	
Time moving	5	hr.	4 hr. 59 min.
Number of cars	50		76
Adjusted tonnage	4,378		2,031
Actual tonnage	3,628		1,499
Total coal, consumed, lb.	16,000		21,200
Total water consumed, gal.	120,000		155,878
Boiler efficiency, per cent	62.1		61.0

tests it developed a maximum cylinder horsepower of 4,073 at a speed of 65.7 miles an hour and a maximum drawbar horsepower capacity of 3,490 at 57.5 miles an hour. This is at the rate of 1 drawbar horsepower for each 98.3 lb. and indicated horsepower for each 84,3 lb. of total engine weight. At the maximum capacity obtained, water was delivered to the boiler at a rate of 70,000 lb. per hour. The maximum tractive force developed by the engine was 46,500 lb., and, with the booster, 56,500 lb.

For several round trip runs over a 140-mile division under conditions of passenger service, with a train of 26 cars, this locomotive developed an average fuel consumption of 2.28 lb. of coal per indicated horsepower hour, including steam for auxiliaries, and 2.07 lb. of coal per indicated horsepower hour, excluding the steam for auxiliaries. Per drawbar horsepower hour the steam consumption was 3.13 lb., including auxiliaries, and 2.83 lb., excluding auxiliaries. The average combustion rate over the division during these tests was about 67.8 lb. of dry coal per square foot of grate per hour. Exclusive of auxiliaries, the water rate per indicated horsepower hour was 16.31 lb., and including the auxiliaries, 18.16 lb. The average boiler efficiency at the header was 78.3 per cent., and the overall thermal efficiency was 6.09 per cent.

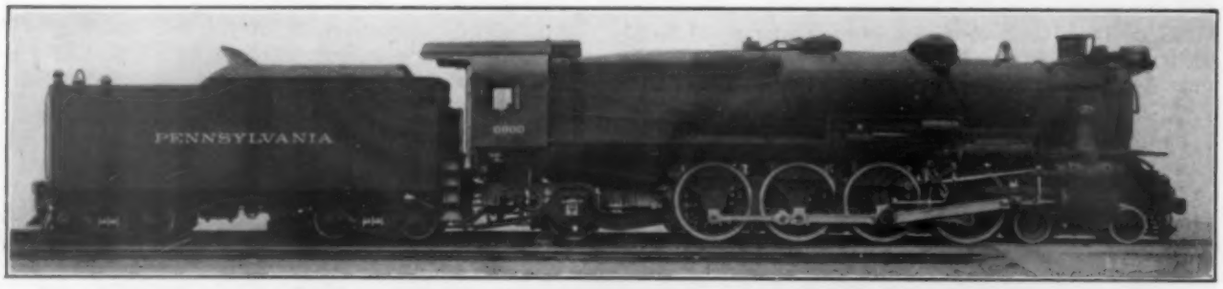
As the result of the performance of the first locomotive, 59 more of these locomotives have since been ordered and are now in service on the New York Central and the Michigan Central.



One of a Lot of 25 Locomtive Bed Castings Made by the Commonwealth Steel Company for the Missouri Pacific

Baldwin Locomotive No. 60,000

Baldwin locomotive No. 60,000, one of the features of the 1926 track exhibit, is again at Atlantic City this year. This locomotive is a three-cylinder compound of the 4-10-2 type, equipped with a water-tube firebox and carrying a working pressure of 350 lb. The total



The Pennsylvania 4-8-2 Type of Locomotive Class M1, on Exhibit at the Pennsylvania Station

Locomotive 5200 was subjected to an extensive program of road tests to determine fully its ability to handle heavy trains on fast schedules. During the

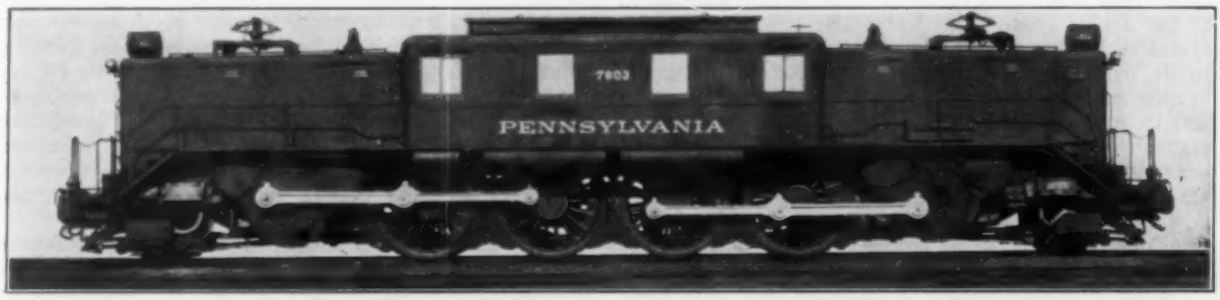
weight of the engine is 457,500 lb., of which 358,400 lb. is on the drivers. The rated tractive force is 82,500 lb. The three cylinders are of the same size, 27 in. by 32 in., arranged with the high pressure cylinder inside and the two low pressure cylinders outside. The driving wheels are 63½ in. in diameter, the evaporating heating surface 5,192 sq. ft., the superheating surface 1,357 sq. ft. and the grate area 82.5 sq. ft. A further description of the locomotive was contained in RAILWAY AGE DAILY, June 14, 1926, page 1773.

During August and September, 1926, locomotive No. 60,000 was tested at the Pennsylvania Railroad stationary plant at Altoona. The general results of these tests were given in a paper presented by Lawford H. Fry at the March 21, 1927 meeting of the Western Railway Club. A summary of the paper was given in the RAILWAY AGE, March 26, 1927, page 975.

During the test the maximum evaporation obtained was 69,695 lb. of moist steam per hour. The boiler efficiency varied from 70 per cent. with 30 lb. of coal fired per hour to 51 per cent. at the maximum rate of 143 lb. of dry coal per sq. ft. of grate per hour. The water rate curve up to 4,500 hp. was unusually low and flat, being between 14.2 and 16.6 lb.

Subsequent to the tests on the stationary plant at Altoona, locomotive No. 60,000 was given a series of road tests between October 13, 1926, and February 25, 1928, on seven railroads which included the Pennsylvania; Baltimore & Ohio; Erie; Chicago, Burlington & Quincy; Atchison, Topeka & Santa Fe; Southern Pacific and Great Northern. These tests were made in both freight and passenger service and included a wide range of operating conditions.

On the Pennsylvania tests were made in heavy freight service between Enola, Pa. and West Morrisville, Penna., 133 miles, a low grade line. In these tests while handling trains arranging from 6,220 to 7,549 adjusted tons the coal required per drawbar-horsepower per hour ranged from 2.9 to 3.4 lb. and the steam per drawbar-horsepower per hour from 17.7 to 20.4 lb. The water rate per lb. of coal ranged from 5.3 to 6.7.



The Pennsylvania Type L5 Electric Locomotive Arranged for Passenger Service

Oil-engine Locomotive Built for the New York Central for Main Line Service and Designed for Both Third Rail and Oil-engine Operation, on Exhibit at the Reading Terminal

On the Baltimore & Ohio tests were made in freight service on three divisions. In these tests the coal used per drawbar-horsepower-hour ranged from 2.09 to 3.36 and

Results of a number of selected runs made by locomotive No. 9000

Stations	Distance, miles	Running time, hrs. min.	Speed, m. p. h.	Total No. of cars	Tons in train	Total g. t. m.	Lb. coal per 1000 g.t.m.	Lb. coal per sq. ft. grate	Actual Evap. per lb. coal
Rawlins—Laramie	117	5-12	22.2	62	4,262	498,654	74	63.5	7.21
Rawlins—Laramie	117	5-18	20.3	63	4,394	514,098	74	65.7	6.56
Rock Springs—Wamsutter	78	3-55	...	78	5,498	428,844	68	76.6	6.57
Wahsatch—Laramie	361	14-7	25.6	72	3,566	1,291,000	66.8	56.6	...
Wahsatch—Laramie	361	13-14	27.4	78	....	1,214,896	68.9	58.4	...
Wahsatch—Cheyenne	418	17-16	24.2	78	....	1,413,370	75.4	57.1	...
Rawlins—Laramie	117	5-52	20	91	4,334	507,078	65	52.0	6.45
Rawlins—Laramie	117	4-51	24	85	3,978	465,426	73	65.0	6.73
Rawlins—Laramie	117	5-53	20	67	4,265	497,005	67	52.1	6.44
Rawlins—Laramie	117	6-21	18	62	4,130	483,210	71	50.0	5.9

the water evaporated per drawbar-horsepower-hour from 16.01 to 26.21, while the boiler efficiency arranged from 56.4 to 76.1 per cent. For comparative purposes tests were also made of the Baltimore & Ohio 2-10-2 type locomotive, class S-1, having 29¾ in. by 32 in. cylinders, 64 in. drivers, 220 lb. boiler pressure, 5,244 sq. ft. evaporative heating surface, 1,470 sq. ft. superheating surface, 88.8 grate area, total weight 436,510 lb. and tractive force 82,730 lb. Locomotive No. 60,000 in comparison showed an economy in coal consumption of 16 to 18 per cent and in water from 20 to 22 per cent with 9 per cent increased evaporation.

The tests on the Chicago, Burlington & Quincy were made on the Beardstown division, a comparatively level line which taps the Illinois coal fields. Comparisons were made with a C. B. & Q. class M-2-A locomotive of the 2-10-2 type. This locomotive has 30 by 32 in. cylinders, 60 in. drivers, 200 lb. steam pressure, 5,342 sq. ft. evaporative heating surface, 1,262 sq. ft. superheating surface, 88 sq. ft. grate area, total weight 388,600 lb. and tractive force of 81,600 lb. The average results of the tests showed a coal consumption per drawbar-horsepower-hour of 3.6 for No. 60,000, and 4.5 for class M-2-A.; the water consumption being 19.9 lb. for No. 60,000 and 24.8 for class M-2-A. This was equivalent to a saving by engine No. 60,000 of 20 per cent in coal and 19.8 per cent in water.

On the Atchison, Topeka & Santa Fe tests were made in heavy grade freight service and comparisons made with results obtained from an A. T. & S. F. 2-10-2 type locomotive, 38,000 class. This locomotive had cylinders 30 in. by 32 in., 63 in. drivers, 195 lb. steam pressure, 5,311 sq. ft. evaporative heating surface, 1,298 sq. ft. superheating surface, 88.3 sq. ft. grate area, total weight of engine 396,000 lb. and tractive force 75,700 lb. The tests showed a saving for No. 60,000 of from 20 to 25 per cent in fuel and water as compared with class 38,000 which operates single expansion and without feedwater heater.

When received on the Southern Pacific, locomotive No. 60,000 had made about 75,000 miles and was in good condition. Before being tested, she was converted from a coal to an oil burner, given a thorough inspection, the driving tires turned and new piston and valve stem packing applied where needed. Tests on the Southern Pacific were made in both passenger and freight service. The machine efficiency of the locomotive in freight service ranged from 86.7 to 90.8 per cent and in passenger service from 75.3 to 87.1 per cent while the thermal efficiency ranged from 6.9 to 7.5 in freight service and 5.8 to 6.6 in passenger service.

After the completion of the Southern Pacific test, locomotive No. 60,000 hauled tonnage trains eastbound on the Great Northern from Delta, Wash., to Minot, N. D., a distance of 1,265 miles. On this test run the locomotive was operated as an oil burner. It was then changed to burn coal and subsequently tested on round trips between Minneapolis and Superior. The results obtained were excellent but no comparison was made with the standard Great Northern locomotives.

Union Pacific 4-12-2 Type

Another locomotive of unusual interest in the track exhibit is the Union Pacific 4-12-2 type, No. 9015. Descriptions of this design were published in both the RAILWAY AGE and Railway Mechanical Engineer, issues of May 15, 1926 and July, 1926, respectively. This class of locomotive, of which the No. 9015 is one of a total of 15 built by the American Locomotive Company for the Union Pacific, has now been in service since April, 1926 and has thoroughly established itself as a successful type. The railroad reports that the 4-12-2 types are pulling the same tonnage on the 1.55 per cent grade between Cheyenne, Wyo., and Laramie, as its Mallet 2-8-8-0 type, and at increased speed and reduced fuel consumption. The 4-12-2 type, it is reported, have also demonstrated their ability to produce 80 per cent more ton-miles than the Mallet types, in the same kind of service, and also with slightly less than half the fuel consumption per thousand gross ton-miles.

The 4-12-2 types haul 3,500-ton fast freight trains between Wahsatch, Utah and Laramie, Wyo., a distance of 361 miles, at an average running speed of 27.4 m. p. h. This division has a number of .81 per cent. grades. The trip, however, is made in 18 hr. 48 min. total time, of which 13 hr. 15 min. is actual running time, the average coal consumption being 62 lb. of dry coal per thousand ton-miles. Forty-eight per cent. cut-off has been maintained at 42 m. p. h., the locomotive developing 4,750 hp. at that speed. The results obtained from a selected list of runs made by locomotive No. 9000, the first of the 15 locomotives delivered, are shown in the table.

This locomotive is equipped with a Worthington feedwater heater pump of the new horizontal style SS. A Nathan mechanical lubricator on one side supplies valve oil to the cylinders while the one on the other side supplies engine oil to the guides. A further feature which will attract attention is the use of chromium plating for the cylinder and valve chamber casing heads.

Lima Texas-Type Locomotive

Another locomotive is a Texas & Pacific 2-10-4 type, No. 640. This is one of a lot of 15 now being delivered to the road by the Lima Locomotive Works and is a duplicate, with slight modifications, of the lot of 10 delivered in November, 1925, which have made so successful a record in service.

A description of the former locomotives of this type was given in the RAILWAY AGE, December 19, 1925, page 1143, and further operating data in the RAILWAY AGE of July 17, 1926.

Commonwealth Locomotive Bed

The Commonwealth Steel Company is exhibiting at the Reading Terminal a locomotive bed casting, one of a lot of 25 recently made for the Missouri Pacific, which embodies the main frames, the cylinder, the cradle, the deck casting and all of the cross ties.

The combining of these various parts into a single casting eliminates hundreds of machined bolts, nuts, and miscellaneous pieces, provides a strong durable foundation for the locomotive, simplifies the construction and effects a great saving in maintenance.

Pennsylvania Pacific Type Locomotive

The Pennsylvania has sent one of its Pacific type locomotives, class K4s, designed for handling fast passenger trains. This locomotive, No. 5498, is one of five which are equipped with Commonwealth cast steel locomotive beds and integral cylinders. A total of 425 class K 4 locomotives are in service on the Pennsylvania system handling through express passenger trains.

Pennsylvania Mountain Type Locomotive

Included in the track exhibit at the Pennsylvania station is one of the 201 Mountain type locomotives operated by the Pennsylvania in freight service on the Philadel-

phia, Middle, Pittsburgh, Conemaugh, Eastern and Ft. Wayne Divisions. These locomotives weight 382,400 lb., of which 266,500 lb. is on the drivers. The cylinders are 27 in. in diameter by 30 in. stroke, the driving wheels, 72 in. in diameter and the boiler pressure is 250 lb. The tractive force is 64,550 lb.

The tender has a one-piece frame of cast steel and is carried on two four-wheel trucks having cast steel side frames. The fuel and water capacities are respectively 35,000 lb. and 11,000 gal. and an air operated water scoop is applied.

The Pennsylvania reports that these locomotives are making a remarkable record in handling heavy tonnage trains at sustained speeds.

Pennsylvania Electric Locomotive

The Pennsylvania electric locomotive which is on exhibit at the Pennsylvania Station on South Carolina avenue, is known as Type L-5 PDB and bears the number 7806. It is a 650-volt direct current locomotive and is equipped with four motors arranged in pairs which drive jack shaft gears through flexible pinions, each of the two jack shafts being coupled to two pairs of drivers by means of side rods. Locomotives of this type are so designed that they can be geared for either freight or passenger service and by a change of control apparatus can be used on 600-volt direct current or 11,000 alternating current. This locomotive has passenger gears and is designed for use in the Pennsylvania New York City terminal. It has a maximum tractive force of 71,800 lb. and a continuous rating of 3,480 horsepower. At this continuous rating it develops 23,300 lb. tractive force at a speed of 56.2 m.p.h., and its maximum speed is 80 m.p.h. The wheel arrangement is 2-4-0+0-4-2, and its total weight is 396,600 lb. The weight on drivers is 298,600 lbs. The gear ratio is 53:95, and the diameter of the driving wheels is 80 in. The electrical equipment was manufactured by the American Brown Boveri Electric Corporation, and the locomotive was built and assembled in the Pennsylvania Railroad shops at Altoona, Pa.

Oil-Electric Locomotive for Main Line Service

The New York Central oil-electric locomotive, No. 1550, which is being exhibited at the Reading Terminal, is the first locomotive of its kind to be built for main line service in this country. It was built jointly by the General Electric, American Locomotive and Ingersoll-Rand Companies for service on the Putnam division of the New York Central. It is designed to operate from either a third-rail or by oil-engine generator power. The total loaded weight of the locomotive is 300,000 lb. of which 170,000 lb. is carried on the drivers. About 60,000 lb. of this weight is due to the addition of the third-rail operating equipment. If the locomotive had been built for oil-engine-generator operation alone, the weight on the drivers would have been about 110,000 lb.

The locomotive has a starting tractive force of 51,000 lb., which decreases to 30,000 lb. at a speed of 5 m.p.h.; 10,000 lb. at 20 m.p.h.; and 4,000 lb. at 40 m.p.h. The diameter of the driving wheels is 44 in. The overall length, measured inside the knuckles is 51 ft. 7 in. and the length over the cab is 46 ft. 5½ in. It has a width overall of 10 ft. The total wheel base measures 42 ft. 10 in. with a rigid wheel base of 17 ft. 6 in.

The oil engine is a six-cylinder, single-acting, four-cycle, solid-injection type of 750 hp. which operates at from 240 to 520 r.p.m. The generator supplies direct current at 600 volts to four GE-286 type motors, having a rating of 415 hp.

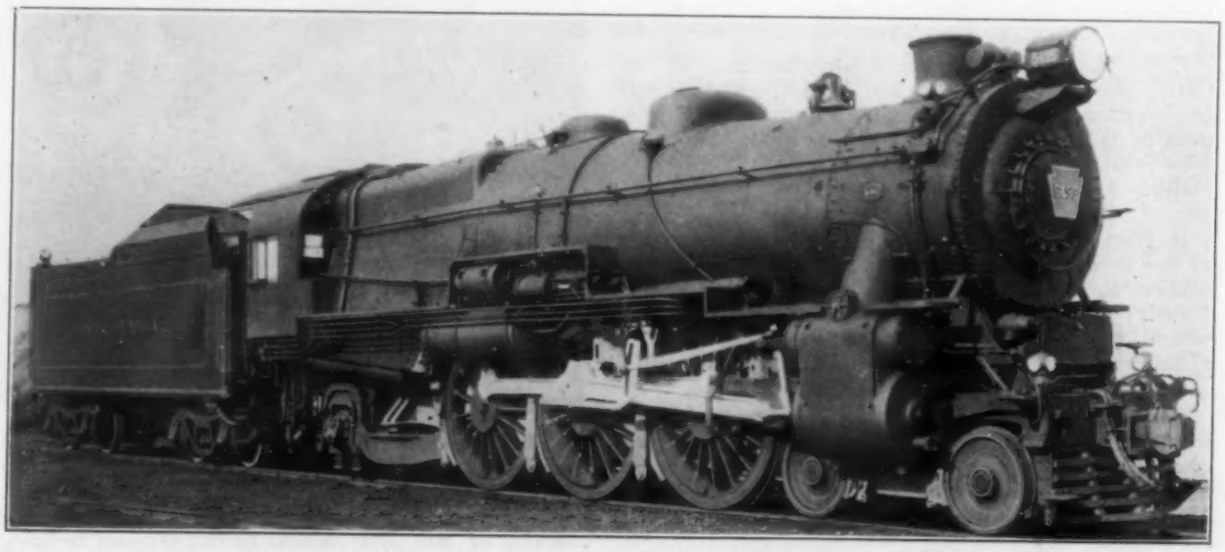
Mack 12-Ton Gas-Electric Locomotive

The Mack Trucks, Inc., is exhibiting the first of its 12-ton gas-electric locomotives designed for switching cars in industrial sidings, for spotting l.c.l. container cars, etc. The unit is powered by a standard Mack model, a.c. 85-hp. gasoline engine. The engine drives two electric motors, one mounted on each axle and ventilated by an engine fan through ducts.

The electrical equipment consists of a self-ventilated generator mounted under the rear hood and driven from the engine by a shaft and two torque insulators. A drum controller is conveniently mounted in the cab which provides a series and parallel connection of motors in both directions. It is also equipped with an electric starting and lighting system, a 12-volt battery, a whistle, a bell, gravity sanders, and hand brakes. Air brakes can be furnished when desired.

The number of gross tons of trailing load that can be handled at switching speeds is shown for the following grades:

Grade	Level	.5 per cent	1 per cent	1.5 per cent	2 per cent
No. of tons	300	100	50	50	25



Pennsylvania Pacific Type Locomotive Equipped with a Commonwealth Cast Steel Locomotive Bed and Integral Cylinders

Conventionalities

C. O. Bradshaw, formerly general manager of the Chicago, Milwaukee, St. Paul & Pacific, is attending the convention as an executive officer of the Robinson Connector Company.

Carl M. Geis, who has attended previous conventions as a representative of the Pyle-National Company from New York City is here this time as chief custodian of the newly opened Boston office.

A short circuit in a machine in the exhibit of the Morton Manufacturing Company in Marine Hall, caused a little commotion Tuesday morning. The blaze was promptly extinguished, however, with practically no damage.

Ernest Wanamaker, electrical engineer of the Rock Island, who appeared on the scene Tuesday, says that one of the present activities of his road consists of the building of three 800-hp. rail motor cars which will use distillate as fuel.

R. M. Wolvin, until recently president of the British Empire Steel Corporation, comprising some twelve companies having a total capital of $500,000,000, is attending his first A. R. A. convention this year as part owner, with Joseph Robinson, of the Robinson Connector Company.

L. G. Coleman, manager locomotive department, Ingersoll-Rand Company, can be found most any time hanging around New York Central oil-electric locomotive which is being exhibited at the Reading terminal. We are glad to see him in such good health after his serious illness of a year ago.

Friends of Alba B. Johnson, president of the Railway Business Association, will be glad to learn that on June 18th, the degree of Doctor of Laws was conferred on him by the University of Vermont at Burlington, Vt. Mr. Johnson delivered the commencement address at Vermont to a class of 195 graduates.

J. E. McQuillen, mechanical superintendent of the Gulf, Colorado & Santa Fe, and J. M. Nicholson, fuel conservation engineer of the Santa Fe, with their wives, came to Atlantic City this year by way of Galveston and New York. They report a very pleasant week on a Mallory Line boat sailing between those points.

B. Haskell, formerly superintendent of motive power of the Pere Marquette, is this year attending the convention as a representative of the Pittsburgh Steel Foundry Corporation. Mr. Haskell is the inventor of several car appliances which are included in the exhibits of different companies that have taken over his patents.

The Enrollment Committee received quite a jolt when they greeted the young lady who for several years has compiled the data for the printing of the registration list. Miss Lillian Raster is now Mrs. Harry Edge. Mr. Edge is a building contractor in Philadelphia and the wedding took place only a few weeks ago, on May 5. Mrs. Edge is not allowing the receipt of congratulations to interfere with the efficiency of her work in the enrollment booth.

John D. Hurley, president of the Independent Pneumatic Tool Company, has a perfect attendance record at these railway mechanical conventions since we first chose Atlantic City as a meeting place in 1906. Mrs. Hurley is with him at the Marlborough-Blenheim. On July 12 Mr. and Mrs. Hurley will sail on the Majestic for a European trip of six weeks or two months, returning on the Berengaria. The visit abroad will be both for both business and pleasure, as the Independent Company maintains offices and stock warehouses in many cities in England and on the Continent.

W. L. Bean, a member of the General Committee of the Mechanical Division and mechanical manager of the New Haven, arrived on Monday morning, and is accompanied this year by his mother, Mrs. S. L. Bean, of Los Angeles. Mrs. Bean has not attended the conventions in recent years, although she frequently accompanied her husband, the late S. L. Bean, when he was mechanical superintendent of the Santa Fe at Los Angeles. Mrs. Bean continues to live on the West Coast because several of her children, including Guy Bean, of the American Arch Company, who is also attending the convention, make their homes in California.

Members of the Purchases and Store Division were recently given a pleasant surprise by the announcement that their genial vice-chairman, C. C. Kyle, general storekeeper, Northern Pacific, had taken unto himself a bride.

They will now receive with regret the news that their friend and co-worker has been ill and, though rapidly recovering, will not be permitted by a determined doctor to attend the convention, much to his disappointment and also that of Mrs. Kyle, whom he had planned to bring with him to Atlantic City.

This Photograph, Taken in the Early Stages of the Construction of Marine Hall and with the Million Dollar Pier in the Background, Gives Some Idea of the Large Addition Which Has Been Made to the Exhibit Space

A Bigger and a Better Exhibit

Marine Hall, direct-connected to the Million Dollar Pier, concentrates all the exhibits under one roof, except for the track display.

THE exhibits in recent years have far outgrown the facilities of the Million Dollar Pier. Two years ago a large temporary structure, known as Machinery Hall, was erected across the Boardwalk from the pier to house the machine tool and heavy exhibits. There was also a tent with a hard floor for the motor transport exhibits adjacent to the Boardwalk at Georgia avenue.

It was hoped that the new Convention Hall would be completed in time this year to house the entire exhibit and all of the convention meetings. When it became evident that Convention Hall would not be completed in time, the Exhibit Committee of the Railway Supply Manufacturers' Association determined that every effort must be made to consolidate the display in a single exhibit under one roof, except, of course, for the track exhibits. The Atlantic City authorities recognized the wisdom of this decision, and, as a result, Marine Hall was erected parallel to the Boardwalk, south of the Million Dollar Pier, and direct-connected to the pier. The motor transport exhibit, of no mean proportions, occupies the south end of Marine Hall.

The track exhibit, as will be noted from another article in this issue, describing its locomotive features, is far more extensive than any of the track exhibits of previous years, and undoubtedly will carry this exhibit well over the top as being the largest ever held under the direction of the R. S. M. A. The convenient location of the greater part of the track exhibit and the arrangements which have been made for bus transportation from the Million Dollar Pier will be greatly appreciated by the railroad representatives.

The Exhibit Committee is still receiving requests for exhibit space assignments. The report last evening was that 382 exhibitors had signed up and that 132,000 square feet of space had been assigned on the Million Dollar Pier and in Marine Hall. The indications are that the number of exhibitors this year, when finally recorded, will surpass that of two years ago, and that while the combined figure for exhibit space on the Million Dollar Pier and in Marine Hall is slightly less than that of the combined space of the Million Dollar Pier, Machinery Hall and the motor transport tent two years ago, the fact that the track exhibit covers about three times as much space this year as in 1926, will carry the total exhibit space this year to a new high record.

Convention attendants will be impressed by the artistic apperaance of the exhibit as a whole.

List of Exhibitors

The following data gives the name of each of the exhibitors, location of the main office of the company, the more important features of the exhibit, the names of the representatives in attendance, and the space or spaces occupied. All spaces above 700 are in Marine Hall.

Adams & Westlake Company, The, Elkhart, Ind.—Metal sash; car curtains; vestibule curtain equipment; vestibule diaphraghms; lighting fixtures; washstands; signal lamps; hardware. Represented by A. S. Anderson, G. B. Allison, E. Andrews, C. E. Basta, Ralph Brown, T. W. Heaton, T. W. Holt, R. D. John, E. L. Langworthy, E. H. Leisch, T. P. O'Brian, W. J. Piersen, W. G. Porter, H. Seip, H. G. Turney, R. D. Whitlock and E. E. Whitmore. Space 638.

Air Reduction Sales Company, New York.—Airco oxygen; Airco acetylene; Airco Davis-Bournonville welding and cutting apparatus and supplies; demonstrations of new No. 4 Oxygraph and the Radiagraph.

Represented by E. M. Sexton, B. N. Law, R. T. Peabody, H. L. Rogers, R. F. Helmkamp, F. Judelsohn, W. H. Ludington, John F. Callahan, H. I. Walsh and G. Van Alstyne. Spaces 639 and 831.

Allegheny Steel Company, Brackenridge, Pa.—Journal box lids; Ascoloy; Allegheny metal. Represented by H. S. Brautigam and O. M. Otte. Space 553.

Aluminum Company of America, Pittsburgh, Pa.—Forged strong aluminum alloy locomotive main and connecting rods; strong aluminum alloy structural shapes; miscellaneous forgings; aluminum dining car chairs; aluminum rigid conduit; Illinois Central suburban trailer. Represented by A. H. Woollen, E. C. Foster, P. B. Jackson, A. B. Wilber, R. B. Whidden, S. K. Bushnell, C. H. Wolfe and Frank C. Barrows, Jr. Spaces 404 and 406, and on track.

American Arch Company, Inc., New York.—Photographs of arch brick. Represented by B. A. Clements, George A. Price, John P. Neff, S. MacClurkan, J. D. Brandon, G. M. Bean, E. K. Cook, T. M. Ferguson, William Haag, Thomas F. Kilcoyne, Thomas Mahar, W. W. Neale, C. T. Pfeiffer, W. E. Salisbury, M. R. Smith, A. M. Sucese and George Wagstaff. Spaces 414, 416, 422 and 424.

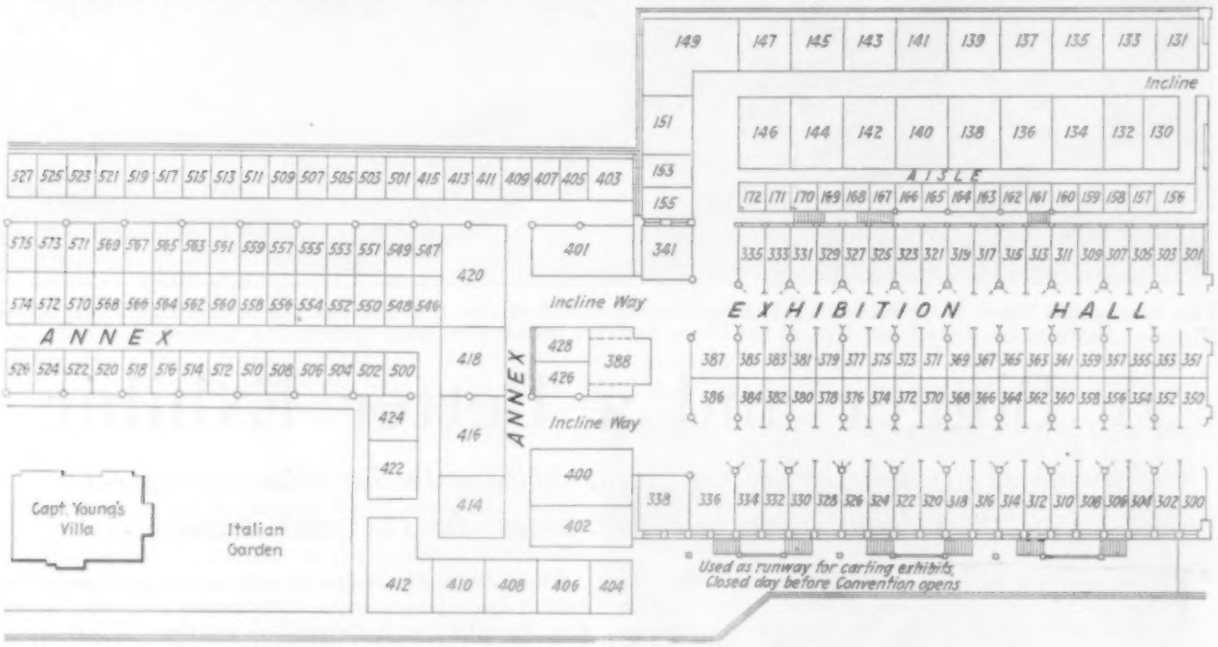
American Brake Shoe & Foundry Company, The, New York.—Special types of brake shoes, A. R. A. standards; malleable iron locomotive brake heads, A. R. A. standards. Represented by F. W. Sargent, W. S. McGowan, G. E. Anne, E. C. Hogan, R. E. Holt, R. D. Jenks, William Minto, J. T. Talbot, M. N. Trainer and T. S. L. Seaman. Space 418.

American Brown Boveri Electric Corporation, Camden, N. J.—Mercury arc rectifier, type GRZ-1612, including panel; full size model of BB individual axle drive; model of contactors of the type P street car controller; wood model of Hellgate turbo-generator group; full size model of train lighting equipment; voltage regulator panel. Represented by C. L. Bardo, William Arthur, L. N. Reed, W. A. Giger, J. M. Van Nieukerken, A. K. Flueler, N. Widner, G. Bruhlman and E. J. Blake. Space 221.

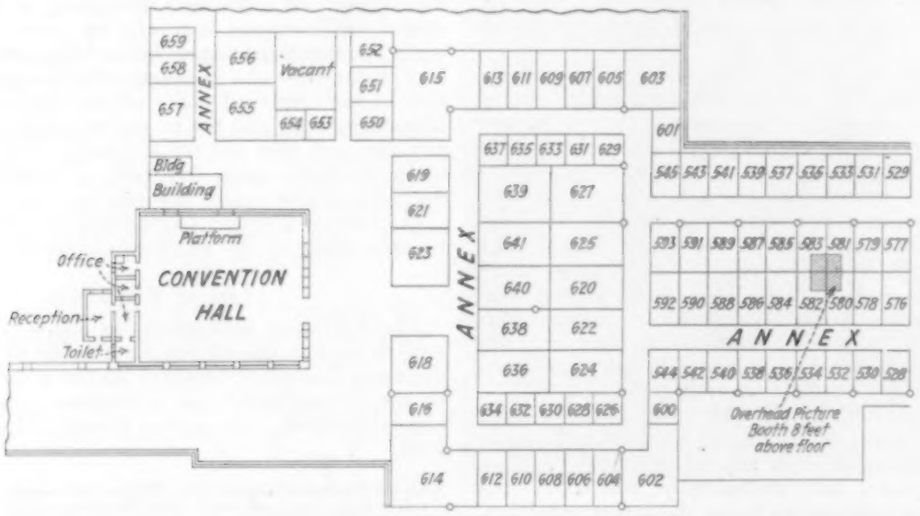
American Car and Foundry Company, New York.—No. 3 three-electrode a-c-f Berwick electric rivet heater for heating rivets; No. 3 one-electrode two-path a-c-f Berwick electric metal heater for forging purposes. Represented by F. C. Cheston and J. S. Helt. Space 732.

American Car & Foundry Motors Company, New York.—29-passenger A. C. F. parlor observation coach with curb level baggage space under raised observation compartment; 21-passenger Series 602, A. C. F. parlor coach; 29-passenger A. C. F. parlor coach with all-steel body; 29-passenger DeLuxe suburban coach; 230-in. wheelbase motor coach chassis, partially disassembled; Hall-Scott engine display in motion. Represented by C. C. Castle, W. L. Stancliffe, R. S. Hayes, Frank Jay, W. J. Overman, J. J. McMahon, F. H. Foglesong, W. B. McCormick, F. L. Martin, W. E. Reed. Spaces 858, 859, 860, 861, 862, 863 and 864.

American Locomotive Company, New York.—Union Pacific type three-cylinder, 4-12-2 locomotive; New York Central Hudson type locomotive; Alco cast steel equalized tender truck; Alco two-wheel outside journal engine truck; Alco four-wheel outside bearing engine truck; Alco lateral motion device; Alco removable hub liners; Economy cellars; Becker wrist pin; Flextite steam pipe casing; Alco reverse gear; Alco staybolts. Represented by J. P. Ennis, F. J. Foley, J. G. Blunt, D. Cooke, R. P. Allison, G. Gurry, R. F. Williams, C. T. Markel, D. W. Fraser, J. R. Magarvey, R. H. White, H. C. Butler, J. Kindervater, E. Duchesne, H. Swoyer, L. S. Carroll, D. Van Alstyne, J. H. Link, F. H. Reynolds,



Arrangement of Exhibit Spaces in Central Portion of Million Dollar Pier



Arrangement of Exhibit Spaces at Convention Hall End of Million Dollar Pier

E. Sheffell, S. Miller, C. M. Muchnic, A. Hamilton, Ross Anderson, M. D. Raymond, H. J. Downes, G. P. Robinson, E. Dickinson, C. Weiler, C. H. Apps, C. Bell, O. R. Hale, A. W. Bruce, A. I. Lipetz and W. Farrell. Space 614 and on track.

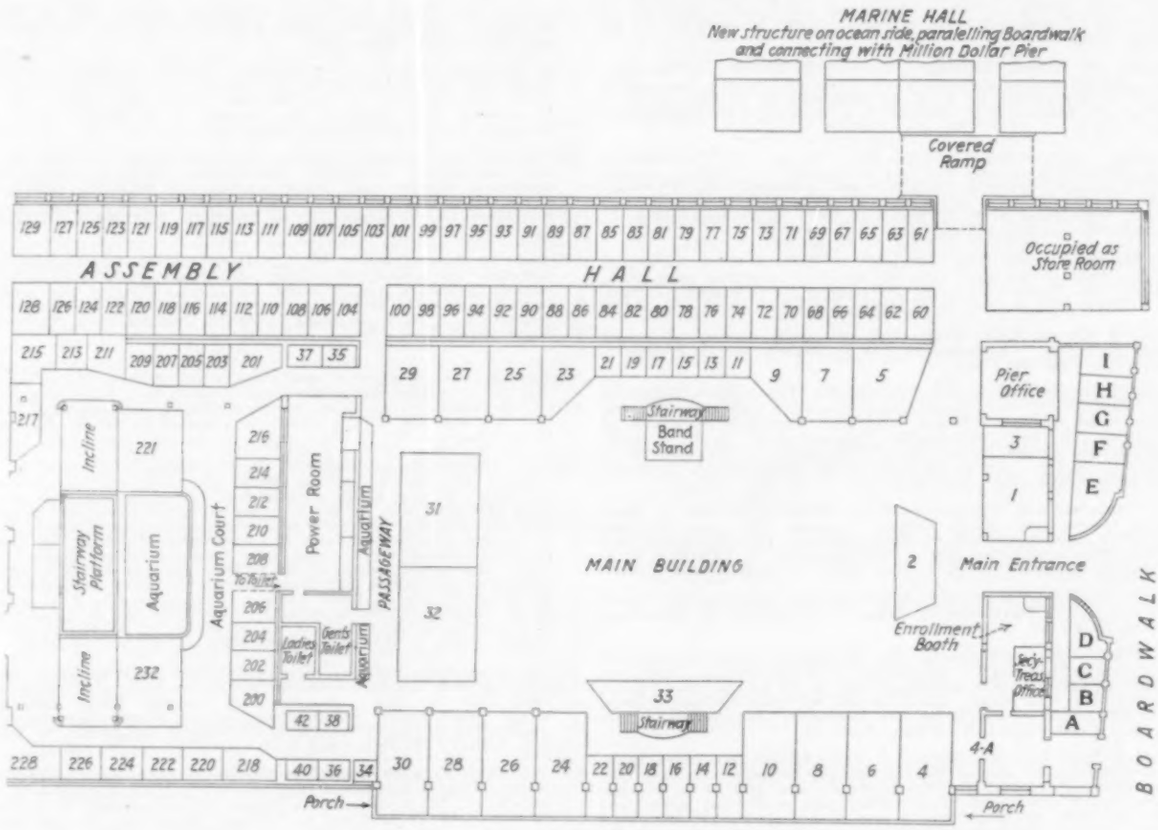
American Optical Company, Southbridge, Mass.—Safety goggles; helmets; masks. Represented by Walter G. King, T. A. Walsh and H. M. Wey. Space 325.

American Steel Foundries, Chicago.—Bolsters; brake beams; couplers; roller bearing truck; side frames; locomotive grates; springs; steel wheels. Represented by G. E. Scott, R. H. Ripley, W. J. Lynch, J. V.

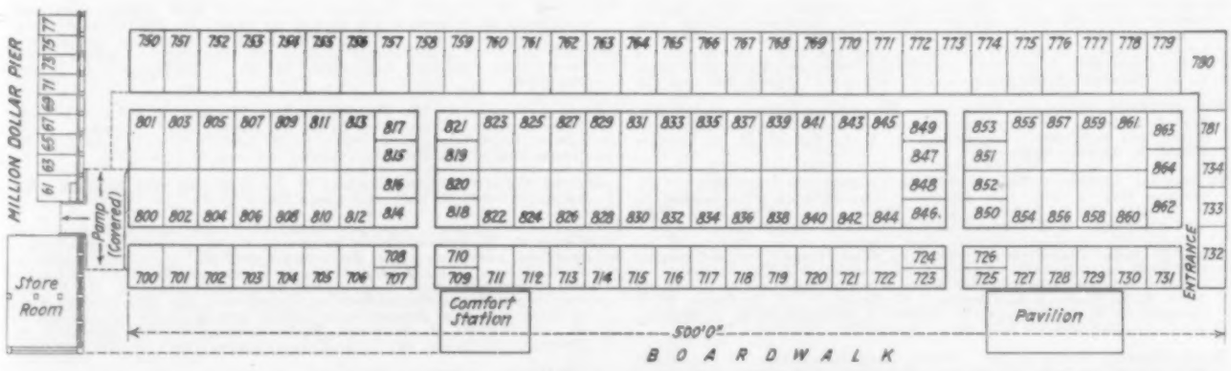
Ames Shovel & Tool Company, Boston, Mass.—Latest designs of standard pattern locomotive scoops and track shovels. Represented by N. E. Brooks. Space 355.

Anchor Packing Company, The, Philadelphia, Pa.—Packing; mechanical rubber goods; asbestos products. Represented by W. R. Haggart, A. J. Benson, D. J. P. Murray, J. P. Landreth and L. E. Adams. Space 367.

Ardco Manufacturing Company, Hoboken, N. J.—Ardco automatic drifting valve (formerly B & S); Ardco automatic bell ringer; Ardco safety cylinder cock; Ardco engine and trailer truck cellars; Ardco car journal oilers. Represented by H. O. Wittpenn, Charles Stern, Thomas Marshal,



Arrangement of Exhibit Spaces at the Boardwalk End of the Million Dollar Pier—Note That Marine Hall Is Direct—Connected to the Pier



Arrangement of Exhibit Spaces in the Newly Erected Marine Hall—It Is Direct—Connected to the Million Dollar Pier

Bell, F. B. Ernst, W. R. Gravener, George G. Floyd, C. L. Heater, L. E. Jonts, P. A. Martin, R. W. McKisson, A. W. MacLaren, A. H. Peycke, C. B. Peirce, H. D. Richardson, J. E. Wright, T. R. Sadler, G. F. Slaughter, S. W. Sargent, W. A. Stearns, W. S. Spieth and W. G. Wallace. Spaces 149 and 151.

American Teksag Products Company, Inc., Mt. Vernon, N. Y.—Colloid for treatment of steam boilers. Represented by E. Leighton and C. B. Kain. Space 767.

American Throttle Company, Inc., New York.—Multiple throttle. Represented by F. A. Schaff and R. M. Ostermann. Spaces 422 and 424.

Jr., Raymond Loughlin, John Draney and A. Biel. Space 616.

Arlac Dry Stencil Corporation, Pittsburgh, Pa.—Arlac dry stencils, ink and other supplies for duplicating devices, for typewriter work, art reproductions, tracings, line work, handwriting, etc. Represented by B. H. Werner, T. H. Boyer and D. C. Weiss. Space 381.

Ashton Valve Company, The, Boston, Mass.—Locomotive safety valves; steam, back pressure and pilot gages; quadruplex, duplex and single air gages; recording gages and attachments for single and double ram wheel presses; locomotive driving wheel quartering gages; dead weight

gage testers; standard test gages. Represented by F. J. Gettrust, H. O. Fettinger and J. W. Motherwell. Space 512.

Associated Publishing Company, Inc., Los Angeles, Cal.—Copies of Transportation. Represented by Harold A. Smith, Arthur E. Hooven, Charles Dillon and Ralph Henderson. Space 717.

Association of Manufacturers of Chilled Car Wheels, Chicago.—Chilled tread wheels of double and single plate design of A. R. A. standard weights. Representd by G. E. Doke and S. C. Massari. Space 144.

Atkins & Company, E. C., Indianapolis, Ind.—Silver Steel saws; saw tools; saw specialties; machine knives; grinding wheels; files; saw guards; scraper blades; Cantol belt wax; hand, rip and panel saws; cross cut saws; metal cutting saws; hack saw blades and frames; metal cutting machinery. Represented by E. S. Norvell, J. W. Hartsook and D. M. Condit. Space 716.

Automatic Nut Thread Corporation, Philadelphia, Pa.—No. 3 Threadnut automatic nut tapping machine; No. 2 Threadnut automatic nut tapping machine. Represented by E. M. de Sherbinin, L. A. Safford, E. C. Godfrey, A. Leavers, R. B. Webster, L. J. Mickle and Edward Ingram. Space 827.

Automatic Transportation Company, Inc., Buffalo, N. Y.—Automatic type LG-36,000 lb. capacity spur gear drive truck; LG-10,000 lb. capacity spur gear drive elevating platform truck. Automatic type TA three-wheel tractor; Automatic type CEA 3,000 lb. capacity locomotive crane truck. Represented by E. L. Kleindinst, R. J. Mulholland and A. C. Bartlett. Spaces 301, 303 and 305.

Baker-Raulang Company, The, Cleveland, O.—Baker elevating truck, type DEXQ; Baker Hylift truck, type DHLQ; Baker locomotive crane truck, type DYAQ. Represented by B. C. Hooper, M. A. Watterson, N. Platt, H. B. Greig, E. J. Bartlett, H. E. McCoy and S. M. Conant. Space 338.

Baldwin & Conrad, Eldon, Iowa.—Full size model showing self-locking freight car door. Represented by Van V. Baldwin and D. F. Conrad. Space 222, Aquarium Court.

Baldwin Locomotive Works, The, Philadelphia, Pa.—Baldwin locomotive No. 60,000 (4-10-2 type, three-cylinder compound with water-tube firebox); model of Caprotti poppet valve gear; locomotive parts made of Eddystone "B" iron; photographs. Represented by A. H. Ehle, S. McNaughton, Charles Riddell, James McNaughton, A. S. Goble, W. B. Keys, R. A. Hey, Charles E. Hale, Henry Blanchard, A. J. Beuter and Latham McMullin. Space 625.

Barco Manufacturing Company, Chicago.—Working models of Barco power reverse gears, Barco all-metal car steam heat connections and Barco 3V type engine and tender connections; Barco lubricated plug valve; Barco air reservoir joints. Represented by C. L. Mellor, A. S. Lewis, W. J. Beblke, Jr., F. H. Stiles and C. O. Jenista. Space 641.

Basford Company, G. M., New York.—Advertising, marketing and merchandising plans. Represented by Roger L. Wensley, R. S. Brown and Walter F. Mulhall. Space 15.

Bassick Manufacturing Company, The, Chicago.—Air and hand-operated equipment for handling rod lubrication; rod fittings; Alemite buttonhead industrial equipment for lubricating valve gears, reverse gears, spring rigging, shoes and wedges, hub plates and bell yoke bearings; Alemite-Zerk fittings and equipment for shop lubrication. Represented by John H. Karow and Norman W. Morse. Space 93.

Bethlehem Steel Company, Bethlehem, Pa.—Charcoal iron boiler tubes; light weight rolled steel freight car wheels; Bethlehem auxiliary locomotive; small model of auxiliary locomotive and some of its principal parts; rolled steel piston heads; axles; alloy steels; tool steels; wire products; bolts and nuts; staybolt iron and steel; track spikes; sheet steel; pole line hardware; structural steel; wrought steel pipe. Represented by E. S. Knisely, H. G. Walton, G. W. Struble, G. F. Hocker, J. H. Smiley, W. B. Pritchard, A. K. Boot, R. J. McCarty, C. H. Froelich, R. C. Wolf, G. W. Armstrong, R. S. Folk, Ira Jordan and J. Tessamine. Spaces 113, 115, 117, 119, 121, 123, 125, 127, 129 and on track.

Bettendorf Company, The, Bettendorf, Iowa.—Bettendorf swing motion caboose car truck with cast steel transoms; Bettendorf-Dalman type truck with roller bearing journals; Bettendorf side frame with inverted bottom member; Bettendorf pin-less journal box lids. Represented by J. W. Bettendorf, J. H. Bendixen, W. E. Bettendorf, C. J. W. Clasen, K. M. Hamilton, F. E. Shults and F. W. Lewis. Spaces 218 and 220.

Bicknell-Thomas Company, Greenfield, Mass.—Counterbores; core drills; flue sheet tools; back spot facers; tap chucks; tapping attachments; thread lead indicators. Represented by L. E. Turner, H. M. Darling and H. E. Eaton. Space 203.

Bird-Archer Company, The, New York.—Sludge remover; Wilson air-operated blow-off cock; new designs of blow-off cock. Represented by P. B. Bird, W. E. Ridenour, L. F. Wilson, C. A. Bird, F. K. Tutt, H. C. Harragin, J. C. Hutton and J. J. Clifford. Space 31.

Black & Decker Manufacturing Company, The, Towson, Md.—Universal and high cycle portable electric tools, including drills, reamers, nut runners, sanders, grinders and screw drivers. Represented by W. C. Allen, R. D. Black, J. K. Courim, J. O. Berry, Jr., E. M. Stuart, R. E. Mizener, G. M. Buchanan, G. F. Fischer, J. K. Laughlin, R. R. Herrick, W. J. Fenwick and H. B. Austin. Space 700.

Bosch Magneto Company, Inc., Robert, Long Island City, N. Y.—Bosch Aero system for heavy oil engines; fuel pumps and injectors for Diesel type oil engines; locomotive lubricators; magnetos; spark plugs; horns; electric generators; bus electrical equipment. Represented by L. Beeh and A. J. Poole. Space 718.

Bowser & Co., Inc., S. F., Fort Wayne, Ind.—Equipment for handling lubricating oils, gasoline, paint oils and paints; fueling units for gas electric cars and buses; Bowser Xacto pipe line meter for all classes of liquids. Represented by L. E. Porter, W. E. Frasier, Jr., H. B. Smith, P. E. Krider and H. B. Pflasterer. Space 28.

Bradford Corporation, The, New York.—Bradford rocker draft gears; Bradford friction draft gears; Bradford Economy truck side frames; Huntoon bolsters; Huntoon brake beams with rigid reversible struts; Bradford truss rod brake beams; Bradford rivetless reversible brake beam strut; Bradford locomotive front end throttle valve; Wagner locomotive throttle valve. Represented by Horace Parker, Floyd K. Mays, Harry F. Lowman, A. F. Stuebing, George L. Kilmer, B. C. Wilkerson, Trent Mays, Burton Mudge, Walter C. Doering, H. C. Priebe, John C. Keene, Arthur A. Helwig, Edward H. Mattingley and Edwin L. Nusz. Spaces 554 and 555.

Bradley & Son, Inc., C. C., Syracuse, N. Y.—Gold plated hammer models. Represented by C. Goodwin Bradley and F. L. Scharff. Space 763.

Bragg-Kliesrath Corporation, Long Island City, N. Y.—B-K vacuum booster brake; B-K automatic brake wear compensator. Represented by Calbe S. Bragg, Victor W. Kliesrath and Frank B. Willis. Space 768.

Brewster, Inc., Morris B., Chicago.—Brewster metallic packing; James driving box with adjustable brass. Represented by Morris B. Brewster and John T. Ash. Space 612.

Brill Company, The J. G., Philadelphia, Pa.—Brill gas-electric cars; photographs. Represented by C. J. McPherson, A. W. Holbrook, F. A. Keihn, C. Chandler, A. H. Hudson, A. F. McCormick, E. T. Bronenkamp, J. C. Bryan, T. K. Thompson, C. B. Schade and A. M. Robinson. Spaces 101 and 103 and on track.

Brown-Lipe Gear Company, Syracuse, N. Y.—Industrial clutches, reversing transmission, seven-speed transmission, five-speed transmission, single-plate clutches and power take-offs for industrial machinery, trucks, buses and rail cars. Represented by J. O. Pierce, E. S. Nottingham, R. V. Hessler, E. A. Brown, E. Fish and C. B. Spase. Space 758.

Brubaker & Bros. Company, W. L., Millersburg, Pa.—Trepanning tool; screwplate set; combined flue sheet tool; bridge reamer; inserted blade reamer; locomotive reamer; coarse flute; crown bolt tap and reamer; staybolt tap; pipe, boiler and hand taps; pipe and bolt dies. Represented by J. A. W. Brubaker, W. Searls Rose and C. W. Borneman. Space 540.

Buckeye Portable Tool Company, The Dayton O.—Portable pneumatic drills, nut setters, screw drivers, grinders and sanders; No. 62 sander and No. 63 grinder for grinding and polishing side rods, valve links, etc., for grinding frame jaws, sanding locomotive cabs and other parts; No. 16-3 drill for tell-tale work. Represented by W. R. Gummere, H. O. Gummere, W. W. Price and G. A. Barden. Space 816.

Buckeye Steel Castings Company, The, Columbus, Ohio.—A. R. A. standard D couplers, top and bottom operating, and new "Rotary operating"; Buckeye Goodwin swivel butt coupler; Buckeye yoke attachment assembled with A. R. A. center sill construction with integral back stop and rear draft lug, and striking casting with integral front draft lug and carrier iron; cast steel truck bolster and truck side frame, including Dalman types; freight car castings; 120-ton Buckeye six-wheel truck model; Dalman Q. W. C. truck and cast steel body bolster, diaphragm, and hopper door frame castings on 70-ton car exhibited by the Wine Railway Appliance Company. Represented by J. G. Bower, G. T. Johnson, H. W. Stertzbach, J. C. Whitridge, F. J. Cooledge, J. C. Larsen, G. A. Sutherland, H. H. Wolfe, M. R. Hansn, W. W. Matchneer and A. H. Thomas. Spaces 603 and 605 and on track.

Buffalo Brake Beam Company, New York.—Brake beams and parts; fourth point supports; auxiliary supports; self-locking brake pins; brake shoe keys; draft key locks; absorption side bearings; hinged draft gear carrier; miscellaneous malleable iron castings; galvanized metals. Represented by E. Strassburger, E. F. Gladwell, A. E. Crone, C. R. Busch, J. L. Logan, F. O. Parker and E. A. Crone. Spaces 500 and 551.

Buffalo Forge Company, Buffalo, N. Y.—Multi-stage blowers; punches and shears; drills; forges; breeze fans; unit heaters. Represented by H. W. Wendt, Jr., W. A. Wagner, G. Zimmer, E. G. Leonard, R. L. Pope, G. Frankel, A. T. Lamb and A. T. Yates. Spaces 703, 704, and 705.

Burden Iron Company, The, Troy, N. Y.—Showboard illustrating different stages in the manufacture of Burden all-pig puddled wrought iron; samples and tests of staybolt iron, engine bolt iron, rivet iron, chain iron, hollow drilled staybolts and iron rivets. Represented by Charles S. Clark, John C. Kuhns and William Downs. Space 211.

Burnside Steel Foundry Company, Chicago.—W & B electric alloy steel side bearings, locomotive and freight car types; locomotive shaker bars; coal picks; coal rakes; clinker hooks; hand brake wheels; carline castings; sill step; miscellaneous castings for locomotives; motor bus and motor truck castings. Represented by W. C. Bladin and H. Moore. Space 763.

Byers Company, A. M., Pittsburgh, Pa.—Wrought iron made by new Aston process. Represented by A. H. Beale, L. M. Johnston, T. L. Lewis, James Aston, E. B. Story, J. H. Ainsworth, C. A. Croft, F. W. Stubbs and C. W. Damberg. Spaces 568 and 569.

Camden Forge Company, Camden, N. J.—Iron and steel forgings. Represented by J. H. Higgins. Space 99.

Camel Sales Company, Chicago.—Model of Youngstown steel doors and Camel No. 50 fixtures applied to all-steel A. R. A. type automobile car; model of Youngstown steel doors and Camel No. 35 fixtures applied to A. R. A. type single-sheathed box car; model of Youngstown steel doors and Camel-Allen flush door applied to single-sheathed A. R. A. type box car; model of corner entrance applied to A. R. A. type car; model of Camel end door fixtures with locking arrangement. Represented by W. W. Darrow, H. E. Creer, T. H. Goodnow, F. C. Heinen A. G. Dohm, C. E. Eklind and K. J. Tobin. Spaces 530, 532 and 534.

Carbo-Oxygen Company, Pittsburgh, Pa.—Cutting and welding gases; cutting, welding and lead-burning apparatus. Represented by C. C. Trees and F. A. Wirth. Spaces 572 and 573.

Cardwell Supply Company, Chicago.—Locomotive air reverse; Car-D Lift. Represented by Thomas Cardwell. Space 776.

Carnegie Steel Company, Pittsburgh, Pa.—Light weight wrought steel freight car wheels; multiple life freight car wheels; multiple life engine tender and passenger car wheels, mounted on axles; steel ties; pair of passenger car wheels that have run 581,139 miles; pair of freight car wheels 22 years in service; new Carnegie beam sections; new Carnegie floor plate and carbuilding sections; 65-ft. gondola car. Represented by W. G. Clyde, C. L. Wood, C. C. Cluff, L. C. Bihler, J. C. Shields, R. A. Marble, G. F. Goddard, F. J. Black, J. F. Miller, R. E. Maxwell, R. W. Steigerwalt, C. G. Purnell, C. Orchard, J. W. Hoover, R. L.

Twitchell, G. R. Schreiner, W. J. O'Neal, G. W. Hagar, E. J. Snyder, J. G. Pattillo, J. F. Hammers, L. H. Wilmot, W. J. Jones and Kenneth Lean. Space 420 and on track.

Celotex Company, The Chicago.—Celotex insulation for refrigerator cars and buildings. Represented by J. H. Bracken, J. H. Thomas, J. R. Thomas and H. A. Winandy. Spaces 632 and 634.

Central Alloy Steel Corporation, Massillon, O.—Toncan seamless iron boiler tubes; Toncan iron staybolts; Agathon engine bolt steel; Toncan iron boiler plate; Enduro stainless iron products; Toncan iron rivets. Represented by F. J. Griffiths, I. H. Jones, D. B. Carson, J. B. Hammond and G. T. Ramsey. Space 137.

Central Iron & Steel Company, Harrisburg, Pa.—Flanged and dished heads; products of the stamping department; manhole frames and covers; Central "Knobby" non-skid floor plates, used for locomotive apron plates, running boards, car loading plates, boiler and power house floors, crane runways, duct covers, step treads, etc.; photographs of various installations of floor plates. Represented by Robert H. Irons, F. C. Carter and B. H. Starr. Space 232.

Central Valve Manufacturing Company, Chicago.—Brass globe and angle valves (Replate, Multiplate and Perfection); locomotive valves; water column drain valves; gage cocks; brass washout plugs; Monel castings. Represented by C. S. Pope, J. E. Brown, C. J. Murphy and C. F. Pigott. Space 130.

Centrifix Corporation, Cleveland, O.—Working model of Centrifix steam purifier; full size models of locomotive domes showing in detail the Centrifix purifier installation; line separators for steam and compressed air purification for use in railway power houses, shops, roundhouses, etc. Represented by L. C. Kerner and George von Haase. Space 811.

Chase & Company, L. C., Boston, Mass.—Chase Velmo (Chase plush) in newest colorings and patterns; Chase Leatherwove upholstery. Represented by H. T. Wight, George E. Sawyer, D. P. Underhill, E. R. Campbell, C. R. Warren and C. J. Dyer. Space 10.

Chaton Fibre Company, Boston, Mass.—Chaton all-fibre dust guards; Chaton combination wood and fibre dust guards; Chaton steel and fibre dust guards. Represented by F. W. Chaney, L. W. Garratt, P. C. Price, S. W. Midgley and J. W. Borrowdale. Space 36.

Chicago-Cleveland Car Roofing Company, Chicago.—Freight car roofs; carlines; uncoupling devices. Represented by C. D. Jenks, J. L. Stark, E. R. Swanson and L. L. Markel. Spaces 590 and 591.

Chicago Pneumatic Tool Company, New York.—Complete line of pneumatic and electric tools, air compressors and miscellaneous accessories; Hicycle electric generator and tools. Represented by H. A. Jackson, A. E. Goodhue, E. K. Lynch, J. L. Rowe, D. E. Cooke, W. A. Kerr, S. A. Congdon, Jr., H. R. DeDubel, E. F. Duffy, R. C. Bucholz, W. A. Andrews, Jr., P. Tarasi and R. M. Porter. Space 623

Chicago Railway Equipment Company, Chicago.—Creco and Drexel brake beams; Creco brake beam supports of the third-point and fourth-point types; Economy brake beam safety guard; Creco bottom rod guard; roller side bearings for freight and passenger cars; Creco ball-bearing car doors. Represented by F. R. Carlson, E. A. LeBeau, E. B. Leigh, A. C. Moore, G. N. Van Sweringen and H. M. Van Sweringen. Spaces 640 and 650.

Chisholm-Moore Manufacturing Company, The, Cleveland O.—Model K Cyclone hoist, equipped with anti-friction bearings at every rotating point; different types of chain hoists, including extended hand wheel hoists; electric hoists and I-beam trolleys; cut-out working models of the Cyclone high speed chain hoist and electric hoists. Represented by F. F. Seaman, J. R. Mears and Al. Kreh. Space 132.

Clark Car Company, Pittsburgh, Pa.—Extension side dump car. Represented by A. H. White, A. H. Weston and F. C. Dankmyer. Space 105 and on track.

Clark Manufacturing Company, The, Philadelphia, Pa.—Smith Multiplex pressure devices, including piston parter, bridge jack, frame bolt jack, extension jack, rail hook, multiplex lifter, pinion puller and Universal grip. Represented by H. I. Smith, W. B. Clark, H. M. Terrell and J. D. Burnham. Space 357.

Clark Tructractor Company, Battle Creek, Mich.—Clark three-ton Truclift; Clarkat three-wheel Tructractor; Clark steel trailers, one and two-ton sizes; Clarktor low lift sand digger, equipped with power-operated shovel bucket. Represented by R. J. Burrows and A. S. Rampel. Space 336.

Cleveland Pneumatic Tool Company, The, Cleveland, O.—Riveting hammers; chipping hammers; air drills; portable emery grinders; holders-on; holder-on riveters; jam riveters; back-fill tampers; Bowes air hose couplings; pressure-seated air valves. Represented by H. S. Covey, A. Scott, R. B. Van Norman, R. B. Ecker, B. H. Tripp, C. J. Albert, J. A. Dockery, F. H. Burr and P. J. Hipes. Spaces 331, 333 and 335.

Cleveland Tanning Company, Cleveland O.—Upholstery leathers of Hyaline, Metakrome, Chroline, Alfatan and Cletan qualities., Represented by F. W. Wilhelmy and Albert Hoinke. Space 34.

Cleveland Twist Drill Company, The, Cleveland, O.—Cle-Forge high speed drills; Peerless reamers; Cleveland locomotive reamers; other tools. Represented by O.B. Hansen, H. G. Smith, I. P. Farnum, R. G. Berrington, F. M. Hoelze, J. G. Ladrick, H. A. Bokram and H. P. Jenson. Space 806.

Coffin,Jr., Company, The J. S., Englewood, N. J.—Coffin feedwater heater system, complete. Represented by J. S. Coffin, Jr., R. P. Peckett, Jr., Paul Willis and E. L. Schellens. Space 110.

Commonwealth Steel Company, Granite City, Ill.—Commonwealth locomotive bed; models of locomotive bed, two-wheel outside journal engine truck, four-wheel and two-wheel Delta type trailer trucks, cast steel ash pan, water bottom tender frame, six-wheel and four-wheel tender trucks, tender frame, four-wheel engine truck, six-wheel straight equalizer truck with integral pedestals, six-wheel drop equalizer trucks with integral pedestals, four-wheel drop equalizer truck with separate pedestals, four-wheel electric railway truck. Represented by H. M. Pflager, George E. Howard, Boone V. H. Johnson, Henry B. Pflager, C. S. Shallenberger, C. P. Whitehead, P. R. Keller, W. M. Sheehan, R. R. Bartell, W. O. Ashe, E. G. Hallquist, G. F. Driemeyer, J. A. McCormick, A. C. Wintemberg and J. C. Travilla, Jr. Spaces 386 and 387, and on track.

Consolidated Ashcroft Hancock Company, Inc., New York.—Hancock locomotive inspirators; Hancock boiler check valves; Hancock feedwater strainers; Hancock globe and angle valves; Hancock coal sprinkler; Hancock rail washer; Hancock oil cup; Consolidated locomotive pop safety valves; Ashcroft locomotive steam gages; Ashcroft cut-off control gages. Represented by H. D. Carlton, W. H. Williston, C. D. Allen, J. H. Bush, L. M. Pearsall and C. L. Brown. Space 636.

Consolidated Car-Heating Company,Inc., Albany, N. Y.—New designs of electric car heater of enclosed element and protected open coil types; thermostatic control equipment; complete pneumatic car door operating equipment with both pneumatic and electro-pneumatic control, including automatic treadle-operated doors; motorman's signal light equipment; high voltage buzzers and bells; automatic ventilators; safety switches; safety switch panels. Represented by C. S. Hawley, W. S. Hammond, George E. Oakley and L. A. Latch. Spaces 118 and 119.

Consolidated Connector Corporation, The, Cleveland, O.—Working model, full size, of new standard American automatic connector, mounted on A. R. A. type D car coupler. Represented by M. A. Barber, C. O. Bradshaw, Joseph M. Brill and Frank F. Gentsch. Spaces 358, 359, 360 and 361.

Consolidated Expanded Metal Companies, The, Wheeling, W. Va.—Booth made of Steelcrete expanded metal; model of expanded metal machine; expanded metal for brake shoes; new methods of manufacturing various devices made of expanded metal. Represented by Thomas R. Herbest, Jr., Charles J. Hoffman, G. O. With, L. S. Signet, F. R. Miller, C. V. Vigor, A. Lackey, George Barnes and M. D. Scott. Space 313.

Consolidated Machine Tool Corporation, Rochester, N. Y.—Photographs of railroad shop machine tools. Represented by A. H. Ingle, W. O. Ingle, Alfred Trosch and H. M. Bowman. Space 707.

Corley-DeWolfe Company, Elizabeth, N. J.—Corley Ground joint unions. Represented by R. A. Corley and H. E. Corley. Space 320.

Cowdrey Brake Tester Organization, Inc., Fitchburg, Mass.—No. 11-A Cowdrey brake tester under Yellow Coach bus. Represented by C. Francis Cowdrey, Jr. Spaces 720 and 721.

Crane Company, Chicago.—Brass locomotive valves and fittings; blow-off valves; pop safety valves; power plant, water service and signal equipment; plumbing for cars, stations and office buildings; air brake connections; unions; union fittings. Represented by J. B. Jordan, F. W. Venton and J. C. Cole. Spaces 504 and 506.

Crosby Steam Gage & Valve Company, Boston, Mass. —Crosby nozzle type muffled locomotive pop safety valves; Crosby Fullway locomotive blow-off valves; Crosby special locomotive pressure gages with double lathe turned screwed tubes; Crosby duplex air brake gages; Crosby locomotive chime whistles; special Crosby recorder for car wheel presses; Crosby fluid pressure scales. Represented by George F. Felker and E. C. Kenyon. Space 635.

Crowe Manufacturing Company, The, Cincinnati, O.—Crowe safety saws, electric, cutting from 1½-in. to 6-⅛-in. stock; Crowe safety saws, air, cutting from 1½-in. to 4-⅛-in. stock; Cincinnati rivet cutting gun. Represented by J. M. Crowe, William C. Noyes, Jess. McClain, J. Mills Summers, J. B. Corby, O. G. Carlson, M. J. DuBois and Herbert Cliffe. Space 515.

Curtin-Howe Corporation, New York.— Sections of car lumber preserved with Zinc Meta-Arsenite, showing penetration and paintability; photographs illustrating the action of wood destroyers. Represented by C. Marshall Taylor, J. H. Waterman, E. H. Walker and W. G. Ritt. Space 369.

Cut-off & Speed Recorder Corporation, New York.—Loco valve pilot. Represented by R. B. Steward, V. Z. Caracristi and F. D. Welden. Space 719.

Davis Brake Beam Company, Johnstown, Pa.—Davis solid truss and Dara rod and channel brake beams; Davis four-point brake beam supports and safety arms; Davis pressed steel journal box lids and metal stampings. Represented by H. E. Chilcoat, C. K. Stillwagon and G. W. Fox. Space 549.

Dearborn Chemical Company, Chicago.—Dearborn treating plant; Dearborn scientific water treatment methods; No-Ox-Id rust preventive. Represented by Robert F. Carr, George R. Carr, C. M. Hoffman, L. P. Bowen, Grant W. Spear, W. H. Kinney and C. A. Remsen. Spaces 6 and 8.

Delta File Works, Philadelphia, Pa.—Delta files and rasps; Duplex file testing machine which tests and measures efficiency of two files at the same time. Represented by Joseph M. Hottel, Arthur L. Brow and John L. Hagar. Space 715.

Detroit Lubricator Company, Detroit, Mich.—Detroit model A locomotive force feed oilers; Detroit automatic flange oilers, pendulum type; Detroit bullseye locomotive lubricators; Detroit transfer filler. Represented by S. A. Witt, C. E. Sperry, G. E. Cage, A. G. Machesney and N. J. Kamen. Spaces 205, 207 and 209.

DeVilbiss Company, The, Toledo, Ohio.—Complete spray-painting and finishing equipment. Represented by E. G. Whitmore, Spaces 828 and 829.

De Walt Products Company, Leola, Pa.—De Walt "Wonder-Worker," direct-driven, all-purpose woodworker, using saws, dado heads, grooving, rabbiting, shaping, routing and other cutters, disc sanding, jointing and sawing, grinding and other attachments; De Walt jointer; De Walt mortiser; De Walt cut-off and miter saw. Represented by W. Ross Stevens. Space 813.

Dickinson, Inc., Paul, Chicago, Ill.—Smoke jacks for roundhouses, cabooses and cars; Aeolus ventilators for shops; damper tops for smoke jacks; cast iron exhaust heads. Represented by A. T. Filkins and A. E. Engman. Space 201.

Differential Steel Car Company, The, Findlay, Ohio.—20, 30 and 50-yd. differential double fulcrum air dump cars. Represented by Harry T. Thompson, H. Fort Flowers, Shelly G. Hughes and Emerson M. Blackford. Space 771 and on track.

Disston & Sons, Inc., Henry, Philadelphia, Pa.—Metal cut-off saws; slitting saws; inserted tooth metal cutting saws; high speed machine hack saw blades; files; metal cut-off machine; metal band saw machine; hack saw machine. Represented by S. H. Disston, C. Forrest, J. Dorrington, Edward Leedy and George E. Hopf. Space 141.

Dixon Crucible Company, Joseph, Jersey City, N. J.—Graphites; graphite products; associated products used on railroads. Represented by J. M. Willits, J. J. Tucker, E. S. Glauch and D. Thurston. Space 612.

Dressel Railway Lamp & Signal Company, Arlington, N. J.—Headlights; marker and classification lamps. Represented by A. D. Hobbie, J. C. Wylie, F. W. Dressel, B. L. Compton and R. C. Schatzman. Spaces 631 and 633.

Dromgold & Glenn, Chicago.—D & G brine retaining valve; D & G opening and one-piece bottom; Pries drop brake mechanism; permanent grain door. Represented by Roy S. Dromgold and Howard A. Glenn. Space 126.

Durametallic Corporation, Kalamazoo, Mich.—Durametallic packing in ring sets and in spiral, for use on cab valves, air pumps, reverse gears, throttles, ball joints, etc. Represented by J. J. McQuillen, Herbert Lewis and C. C. Hall. Space 89.

Eagle Ottawa Leather Company, Grand Haven, Mich.—Upholstery leather for railroad car and bus seats. Represented by George W. Frey, Jr. and Frank Kennedy. Space 363.

Ebinger Sanitary Manufacturing Company, The D. A., Columbus, Ohio.—Ebco wash room equipment, including circular porcelain enameled wash sinks; Ebco drinking fountains for both ice and mechanical refrigeration; Ebco automatic pressure regulating valves for drinking fountains. Represented by Aden E. Smith. Space 722.

Edgewater Steel Company, Pittsburgh, Pa.—Edgewater ring spring draft gear; 56-in. locomotive tire; 30-in. engine truck wheel; 36-in. tender wheel; 50-in. trailer wheel. Represented by W. V. D. Wright, J. H. Baily, O. R. Wikander, D. W. McGeorge, J. H. Perry, Jr., Scott Donahue, C. H. Sherburne, L. O. Cameron, E. A. Thornwell and H. J. Tierney. Spaces 588 and 589.

Edison Storage Battery Company, Orange, N. J.—Edison steel alkaline storage batteries, single cells and in tray assemblies; miniature storage battery car. Represented by G. E. Stringfellow, D. C. Wilson, W. F. Bauer, D. B. Mugan, J. L. Hays, O. R. Hildebrand and J. F. Coakley. Space 624.

Edna Brass Manufacturing Company, The, Cincinnati, O.—Mechanical lubricator, 1928 model; water column, type EF; rigid water gage; boiler check for feedwater heater; oil burner; cold water sprinkler; fire extinguisher; air operated cylinder cock; air manifolds, types K and KM; automatic pump oilers; USNA non-lifting injectors; Pennsylvania Railroad hydrostatic lubricator. Represented by William Beck, R. B. Buram, E. O. Corey, J. E. Dillon, L. S. Dromgold, H. A. Glenn, D. B. Joseph, B. I. Kaufmann, E. F. O'Connor, C. B. Randall, W. E. Snyder and F. S. Wilcoxen. Space 128.

Edson Manufacturing Corporation, Boston, Mass.—Edson diaphragm pumps; Edson lift and force pumps; Edson No. 3, type A pump with "on-top" gasoline engine; Edson double-acting pumps with "on-top" engine; Edson diaphragm and power pump accessories. Represented by L. O. Arringdale. Spaces 566 and 567.

Edwards Company, Inc., The O. M., Syracuse, N. Y.—Window fixtures; extension platform trap doors; top, bottom and side weatherstripping; metal stop casing nad parting stop; metal sash balances; brass sash. Represented by O. M. Edwards, Sr., Harold Edwards, J. J. Edwards, O. M. Edwards, Jr., E. F. Chaffee, F. W. Chaffee, C. H. Cronmiller and C. H. Rockwell. Spaces 525 and 527.

Electric Service Supplies Company, Philadelphia, Pa.—Golden Glow locomotive headlight; Keystone turbo-generators; Golden Glow floodlights; Keystone headlight switches; Keystone lamp guards. Represented by C. J. Maver, A. H. Englund, J. W. Porter, H. G. Lewis, H. D. Rohman, T. H. Williams, J. F. Carper, J. C. Pope, C. W. Berg and H. J. Graham. Spaces 574 and 575.

Electric Storage Battery Company, Philadelphia, Pa.—Exide batteries and Exide Ironclad batteries for railway, bus and industrial truck and tractor service. Represented by H. E. Hunt, H. B. Crantford, E. H. Watkins, H. C. Folk, A. H. Adkins, L. E. Lighton, J. C. Carson, W. Van C. Brandt, E. C. Kline and W. E. Fischelis. Spaces 607 and 609.

Electro-Chemical Engineering Corporation, Chicago.—Apparatus used in prevention of pitting and corrosion in boilers; samples of tubes showing results obtained. Represented by L. O. Gunderson and O. W. Carrick. Space 774.

Electro-Motive Company, The, Cleveland, Ohio.—Gas-electric power plants for rail cars and locomotives. Represented by O. F. Brookmeyer, A. M. Smith and P. R. Turner. Space on track.

Elliott Company, Jeannette, Pa.—Tube cleaners for arch tubes, boilers, etc., photographs of power plant equipment. Represented by H. A. Pastre and T. F. Crawford. Space 751.

Elwell-Parker Electric Company, The, New York.—Three-ton electric portable crane; three-ton Hi-Lo lift and tiering tructor; three-ton Mill type lift tructor. Represented by L. C. Brown, G. W. Brown, H. G. Hansen, J. P. Lyons, C. B. Cook, George C. Isbester, A. H. Dobler, F. B. Neely, W. B. Speirs, A. D. Bowman and W. G. O'Brien. Space 341.

Enterprise Railway Equipment Company, Chicago.—Ballast, bopper and gondola cars; door operating mechanism for hopper cars; Symbol car doors for box cars. Represented by Argyle Campbell, R. T. Coyne, G. B. Dorey, W. L. Gunnison and A. E. Zimmer. Spaces 584 and 585, and on track.

Equipment Specialties Company, Chicago.—Equipco all-metal bulkheads for refrigerator cars; drain traps; drain spouts; flush floor rack holders. Represented by L. L. Cohen and George A. Hull. Space 326.

Everlasting Valve Company, Jersey City, N. J.—New Erie type tender tank valve; new improved disk spring for Everlasting valves; Everlasting's companion angle valve; Everlasting duplex blow-off unit; Everlasting special water column valve; valves for boiler washout service; Wylie Wilson boiler draw-off process. Represented by John H. Allen, E. N. Corning, S. E. Carman and G. M. Elton. Space 224.

Ewald Iron Company, Louisville, Ky.—Staybolt iron; engine bolt iron; hollow drilled staybolts. Represented by J. P. Bourke, W. R. Walsh, E. V. Shackleford, G. O. Boomer and Baylor Hickman. Space 535.

Fairmont Railway Motor, Inc., Chicago.—Mudge Security unit spark arrester; Mudge-Peerless ventilators; Mudge exhaust blower; Mudge angle cock holders; Mudge pipe clamps. Represented by Albert C. Force, E. R. Mason and Arthur R. Fletcher. Space 87.

Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio.—Hollow and solid staybolt bars; hollow and solid fabricated staybolts; test specimens. Represented by C. M. Walsh, E. J. Raub, R. L. Skidmore and J. T. Doyle. Space 734.

Flannery Bolt Company, Pittsburgh, Pa.—Tate and F. B. C. flexible staybolts; Flannery telltale flexible staybolts; Flannery rigid, crown and buttonhead stays; hollow rigid staybolts; tools for application of flexible staybolts; new MK assemblage of two-piece flexible staybolt; Nu-Tate flexible staybolts; installation of various types of staybolts in boiler section. Represented by J. Rogers Flannery, E. G. Flannery, E. S. Fitzsimmons, E. J. Reusswig, G. R. Greenslade, John H. Murrian, L. Finegan, W. M. Wilson, B. C. Howard and F. K. Landgraf. Spaces 592 and 593.

Foley Saw Tool Company, Inc., Minneapolis, Minn.—Foley automatic saw filers; Foley automatic grinder for high speed hack saw blades and metal cutting saws, circular rip and cut-off saws. Represented by Walter M. Ringer, Glenn O. Steen, Purdon Carpenter and J. K. Chalmers. Space 752.

Ford Company, The J. B., Wyandotte, Mich.—Wyandotte cleaning specialties. Represented by B. N. Goodell, G. J. Lawrence and W. P. Scott. Space 517.

Forsyth Draft Gear Corporation, Chicago.—Forsyth friction draft gear. Represented by J. E. Forsyth and Joseph S. King, Jr. Space 327.

Fort Pitt Malleable Iron Company, Pittsburgh, Pa.—Various standard railroad car castings; distorted car parts demonstrating quality of Fort Pitt malleable iron; dome cover and ring for tank cars illustrating machinability and exactness of thread. Represented by Frank I. Lanahan, J. S. Lanahan, H. J. Kummer, E. H. Holmes and G. P. Laurent. Space 549.

Franklin Railway Supply Company, Inc., New York.—C-2-R booster; tender booster application model; type G precision power reverse gear; type E Franklin power reverse gear; McLaughlin and Franklin sleeve joint; grease lubricators; grate shaker; booster ball joints; limited cut-off model; Lubrite automatic adjustable driving box wedge; lateral motion driving box radial buffer and safety bar; sectional model booster valves. Represented by W. H. Coyle, H. M. Evans, J. L. Randolph, W. T. Lane, J. McLaughlin, P. Weiler, C. W. F. Coffin, C. J. Buck and M. H. Roberts. Spaces 414, 416, 422 and 424.

Frost Railway Supply Company, The, Detroit, Mich.—Frost friction truck springs; Harvey friction draft springs. Represented by Harry W. Frost, George A. Cooper and Harry W. Frost, Jr. Space 560.

Gairing Tool Company, The, Detroit, Mich.—Interchangeable counterbores; spotfacers; core drills; multiple operation tools, solid and inserted blade type, showing new application of inserted blade cutters for boring and reaming; special off-set spotfacing heads, reamers and end cutting tools. Represented by E. Gairing, C. E. Wyrick, B. O'Meara, E. T. Gropler and D. J. Normoyle. Space 710.

Galena Signal Oil Company, Franklin, Pa.—Reception booth. Represented by M. J. A. Bertin, W. A. Trubee, George L. Morton, C. C. Creighton, C. G. Melvin, D. L. Eubank, J. S. Brown, L. K. Morrison, N. E. Sprowl, A. J. Howley and F. M. Shelton. Space 32.

Galena Signal Oil Company of Canada, Ltd., Toronto, Ont.—Reception booth. Represented by E. Hawker and C. McNair. Space 32.

Garlock Packing Company, The, Palmyra, N. Y.—Locomotive cab cock packing; locomotive air pump packing; locomotive throttle packing; power reverse gear packings; asbestos cups for pistons on reverse gears; Mallet ball joint packing; expansion packings; boiler feed pump packings; various types of locomotive gaskets. Represented by G. L. Abbott, H. W. Gulager, H. M. Sweetin, V. R. Kleyla, H. J. Ramshaw, H. A. Clark, Joseph Yamin, M. P. Junkin, P. D. Miller, L. P. Duggan, I. N. McAllister. Space 538.

General Electric Company, Schenectady, N. Y.—Arc welding motors and control model train and locomotive; radio transmission and reception by G-E portable freight train outfit. Represented by G. P. Baldwin, W. B. Potter, R. F. Goggin, F. I. Kittredge, O. J. Gilcreest, C. C. Bailey, C. C. Runner, C. F. Pittman, F. T. Smith, C. C. Pierce, C. B. Keyes, F. S. Hartman, H. L. Andrews, C. K. West, C. A. Woolford, J. J. Liles, R. D. Krape, C. E. Baker, C. M. Davis, W. M. Guynes, A. H. Armstrong, W. J. Hedley, F. L. Sahlman, F. A. Faron, P. M. Gillilan, F. P. Jones, J. A. Boers, W. F. Geddes, E. S. Johnson, I. H. Joyce, J. D. Gaughan, S. T. Dodd, F. A. Kroner, B. C. Tracey, John Roberts, Lynn Covey, G. H. Roosevelt, C. Dorticos, W. S. H. Hamilton, G. E. Watts, E. F. Chilberg, T. H. Reeves. Spaces 5, 60, 62, 64, 66, 68, 70 and 72.

General Motors Truck Company, Pontiac, Mich.—Yellow type Z-33 city service coach; type Y parlor car; type Z-33 chassis; type Y chassis; Yellow sleeve valve cut away engine; G M C truck. Represented by H. E. Listman, R. E. Fielder, R. C. Snell, J. L. Byers, I. J. St. Croix, E. Brackett, R. Scott Smith, E. J. Stone and E. D. Rutherford. Spaces 844, 845, 846, 847, 848 and 849.

Giant Manufacturing Company, Council Bluffs, Iowa.—Journal jack; steam packing; floodlights; pipe pushers. Represented by C. R. Harding. Space 372.

Giessel Company, Henry, Chicago.—Sanitary drinking water coolers; drinking water filters; auxiliary appliances. Represented by Henry Giessel, S. W. Midgley, R. W. Preikschat, Ross F. Hayes and C. H. Kadie. Spaces 38 and 42.

Gilbert & Sons Brass Foundry Company, A., St. Louis, Mo.—Rough and finished car and engine bearings and miscellaneous castings; babbitt metals; solders; Gilbert Diamond G fire extinguishers. Represented by C. F. Gilbert and D. M. Brydie. Space 654.

Gilg, Henry F., Pittsburgh, Pa.—Samples of staybolts made from rolled hollow steel bars. Represented by Henry F. Gilg. Space 637.

Gold Car Heating & Lighting Company, Brooklyn, N. Y.—Locomotive car pressure reducing valves; vapor car heating equipment; standard and two-inch steam heat connections for rear of tender and between cars; automatic temperature control; electric heating equipment ventilators, etc. Represented by Edward E. Gold, A. B. Strange, Franklin H. Smith, Tom Moore, E. B. Wilson, F. W. Dearborn, A. D. Stuver, H. W. Dillon, J. P. Rapp, J. O. Brumbaugh, C. W. Stevens and Elmer Barr. Spaces 350, 351, 352 and 353.

Goodall Rubber Company, Philadelphia, Pa.—Semi-metallic squirt hose; Subway air hose; packings; lip type air brake hose gaskets; air brake hose. Represented by C. L. Butler, C. P. Green and G. B. Wood. Space 733.

Goodrich Rubber Company, The B. F., Akron, O.—Reception booth. Represented by E. A. Bedell, B. F. Moffatt, A. R. Miller, Frank Flavell, F. W. Wocher and A. B. Peacock. Spaces 18, 20 and 22.

Goodyear Tire & Rubber Company, Inc., The, Akron, Ohio—Reception booth. Represented by W. T. Bell, C. R. Weaver, C. W. Sullivan, W. D. Dalrymple, W. H. Oliver, E. F. Preston, A. Calhoun, W. J. Cameron, R. Gimmel, and Robert Thomas. Space 765.

Gould Coupler Company, The, New York.—Truck side frames; truck bolsters; passenger car couplers; passenger car coupler yokes; passenger car truck pedestals; miscellaneous O. H. S. castings. Represented by C. J. Symington, G. L. L. Davis, J. A. Sauer, R. H. Gwaltney, Hynes Sparks, Bruce M. Jones, A. E. Heffelfinger, M. M. Llera, J. A. Cameron, C. R. Naylor, H. K. Smith, R. T. Knapp, A. G. Brandenburg, I. O. Wright and W. J. Roehl. Spaces 134, 136 and 138.

Gould Storage Battery Company, Inc., New York.—Storage batteries for all railroad purposes. Represented by K. M. Smith, C. W. Bell, L. C. Hensel, A. M. Andersen and A. J. Davis. Spaces 308 and 310.

Graham Bolt & Nut Company, Pittsburgh, Pa.—Bolts; nuts; rivets; Selflock unit lock nuts; "Gco" high yield bolts. Represented by Charles J. Graham, W. T. Kilborn, W. C. Masters and W. E. Fowler, Jr. Space 81.

Graham-White Sander Corporation, Roanoke, Va.—Graham-White locomotive sanders, manually operated; locomotive sanders, automatically operated; Graham-White sand spreaders. Represented by James Frantz, Virgil L. Frantz, W. H. White and F. H. Smith. Space 544.

Griffin Wheel Company, Chicago.—Chilled car wheel. Represented by C. K. Knickerbocker, A. A. Hale, F. B. Flinn, C. P. Whitcomb, J. L. Grant, George Acker and F. L. Whitcomb, Jr. Space 620.

Grip Nut Company, Chicago.—Grip nut products. Represented by W. E. Sharp, W. F. Mitchell, L. W. Kass and J. E. Weatherford. Spaces 546 and 548.

Hale & Kilburn Company, Philadelphia, Pa.—Walkover and stationary DeLuxe seats for coaches, interurban cars, gas rail cars and motor coaches; DeLuxe double rotating chairs for main line DeLuxe coaches. Represented by R. D. Day, W. M. Swope, R. F. Stubblebine, H. B. Gengenbach, W. J. Clair, R. O. Young and W. G. Flood. Spaces 408 and 410.

Hanlon Locomotive Sander Company, Winchester, Mass.—Hanlon track sanders with single and duplex operating valves; Bulls-eye water gages, single face and angle types. Represented by W. J. Hanlon, J. W. Hanlon and J. H. Hanlon. Space 306.

Hanna Stoker Company, The, Cincinnati, O.—Locomotive stoker. Represented by W. T. Hanna, C. D. King and S. K. Witt. Space 139.

Hennessy, J. J., New York.—Engine truck journal lubricator; A. R. A. journal lubricator. Represented by J. J. Hennessy and Frank M. Parker. Space A.

Hertzler & Zook Company, Belleville, Pa.—18-in. engine lathe with H. & Z. motorization; small filing lathe with H. & Z. motorization; adjustable, portable speed reducer. Represented by John Settle. Space 823.

Heywood-Wakefield Company, Wakefield, Mass.—Seats and seating for steam coaches, parlor cars, club cars and buses. Represented by E. C. Lang, G. E. Cornwall, Bertram Berry, C. E. Preble, T. D. Owler, J. V. Conway, W. E. Foreman, A. F. McLachlin and J. H. McBean. Spaces 522, 524 and 526.

Hisey-Wolf Machine Company, The, Cincinnati, O.—Electric drills and screw drivers; electric bench and pedestal grinders; electric buffers and polishers; portable electric grinders and buffers; tool post and angle plate grinders. Represented by E. Ritz, Jr., George Moerlein, J. W. Friedlander, H. W. Wallace, P. A. Rebak, R. C. Howell and S. H. Ford. Space 713.

Houghton & Co., E. F., Philadelphia, Pa.—Houghtometer; Vim belts; absorbed oils; cutting oils; Houghtoclean; Drawtemp; quenching oils; Rustvetos; carburizers. Represented by E. H. MacInnis, C. W. Noel, J. Coleman Bentley, H. C. Finck and F. A. Teeple, Jr. Space 766.

Hubar-Jones Corporation, The, New York.—Godfrey oxygen jet cuting machine; samples of work. Represented by H. Hulatt and E. B. Stone. Space 750.

Hulson Grate Company, Inc., Keokuk, Iowa.—Half size model, complete, of standard Hulson locomotive grate; model of tuyere type grate. Represented by A. W. Hulson, J. W. Hulson and H. N. Garner. Space 318.

Hunt-Spiller Manufacturing Corporation, Boston, Mass.—Locomotive parts of Hunt-Spiller air furnace gun iron, including cylinder packing rings, pistons, piston bull rings, cylinder bushings, valve packing rings, valve bull rings, piston valve bushings, crosshead shoes, shoes and wedges, floating rod bushing installations and hub liners; Duplex sectional packing rings; Dunbar sectional packing rings; Duplex packing ring springs; brake drums of Hunt-Spiller iron for heavy duty buses and trucks. Represented by J. G. Platt, V. W. Ellet, E. J. Fuller, A. B. Root, Jr., F. W. Lampton, C. L. Galloway, F. B. Hall, R. R. Wells, D. F. Hartman, Gordon L. Leach and L. O. Arringdale. Spaces 564 and 565.

Hutchins Car Roofing Company, Detroit, Mich.—Models of Universal dry lading all-steel roof. Represented by S. L. Beymer, J. F. Comee, F. C. Dunham, J. T. Martyn, C. F. Pape, W. D. Thompson and A. R. Wilson. Space 619.

Hutto Engineering Company, Inc., Detroit, Mich.—Model MJ horizontal grinding machine; model MD vertical grinding machine; model MG grinding machine with double head; Hutto improved portable grinder stand with air cylinder attachment. Represented by G. C. Paye, G. M. Alderman and B. O. Isom. Space 805.

Hyatt Roller Bearing Company, Newark, N. J.—Hyatt roller bearing railroad journal boxes for standard A. R. A. pedestals; demonstration of how Hyatt journal boxes are interchangeable with A. R. A. brass journals without alteration to the truck; illustrations of Hyatt roller bearing applications on American and Canadian railroads. Represented by H. J. Forsythe, H. O. K. Meister, H. K. Porter, V. N. Delamater, J. H. Wiley, C. A. Johnson, C. M. Burdette, D. H. McAvoy, O. W. Young and H. M. Carroll. Spaces 143 and 145.

Hynson, Westcott & Dunning, Baltimore, Md.—Mercurochrome-220 soluble, powder and tablets; Mercurochrome solution applicator bottles for first-aid antiseptic purposes. Represented by W. Rodney Burton Nathaniel Nicolai and L. C. Shepherd. Space 131.

Illinois Steel Company, Chicago.—Steel products. Represented by O. H. Baker, Grant Monk, C. B. Friday, C. R. Moffatt and N. M. Hench. Space 420.

Independent Pneumatic Tool Company, Chicago.—Thor high frequency and Thor Universal electric drills, reamers, screw drivers and nut setters; Thor pneumatic drills, reamers, chippers, scaling hammers, riveters, rivet busters, and close-corner drills; new rotary sanders and grinders; 71R pneumatic wrench. Represented by J. D. Hurley, R. S. Cooper, R. T. Scott, A. Anderson and A. L. Schuhl. Spaces 556 and 557.

Industrial Brownhoist Corporation, Cleveland, O.—Photographs of Industrial Brownhoist wrecking cranes, locomotive cranes, pile drivers, ballast cleaning machines and heavy dock machinery. Represented by G. L. Harman, Benjamin Dixon and W. L. Brown. Space 365.

Ingersoll-Rand Company, New York.—Electric driven air compressor; pneumatic tools, including riveting hammers, chipping hammers, pneumatic drills, grinders, close-quarter drills; air motor hoists in seven sizes; Safety-First air saws; Utility portable hoists; sand rammers; pneumatic tool accessories. Represented by G. A. Gallinger, W. A. Johnson, J. F. Kroske and F. M. Cross. Spaces 61, 63, 65, 67 and 69.

Insulite Company, The, Minneapolis, Minn.—Models showing Insulite insulation applications in refrigerator and bunk cars; illustrations showing uses of insulite insulation in building construction. Represented by D. D. Grassick, F. J. McNeil and L. F. Johnson. Space 770.

International Nickel Company, Inc., The, New York.—Nickel steel side rod; wear resisting nickel iron brake shoe and wedge; nickel iron cylinder liner; nickel steel forgings and castings for locomotives; nickel iron test specimens; Monel metal vital parts of Worthington Pump & Machinery Corporation's B. L. feedwater heater; Monel metal bolts and nuts. Represented by A. H. Galley, E. J. Bothwell, Charles McKnight, L. Muller Thym, C. R. Jordan and A. L. Roberts. Spaces 332 and 334.

International Trade Press, Brooklyn, N. Y.—Space 722.

Interstate Iron & Steel Company, Chicago.—Samples of rolled, sections, including rounds, squares, hexagons, octagons and flats, and also spring steel; small locomotive parts, such as bolts, studs and pins of alloy steel; split ingot of alloy steel. Represented by L. L. Solger. Spaces 818 and 820.

Irving Iron Works Company, Long Island City, N. Y.—Irving Safkar running board; brake step; passenger and caboose steps; locomotive step; Irving Safcross slab. Represented by L. H. DeVoe, W. A. Brady and W. E. Noblett. Spaces 375 and 377.

Isothermos Corporation of America, New York.—Isothermos journal boxes; universal journal boxes with automatic lubrication, for cars, locomotives and tenders (inside or outside bearings); working models. Represented by Alfred de Bac, F. O. Willhofft and Joseph Goffin. Space 775.

Jekins Brothers, New York.—Car heating gaskets; mechanical rubber goods; bronze, iron and steel valves. Represented by Charles B. Yardley and George Royal. Space 561.

John-Manville Corporation, New York.—Passenger and refrigerator car insulations; power plant insulations; packing materials; smoke jacks; electrical materials; industrial flooring; passenger car flooring; acoustical treatment; roofing and building materials; waterproofing materials. Represented by G. A. Nicol, Jr., R. P. Townsend, H. Flannagan, H. R. Poulson, P. D. Mallay, J. D. Johnson, T. J. O'Leary, Jr., J. H. Trent, C. H. Clingman, L. Papineau, W. R. Bush, J. C. Younglove, F. J. Horne and George Christenson. Spaces 514, 516, 518 and 520.

Jones Machine Tool Works, Inc., Philadelphia, Pa.—Vertical shaper and slotter. Represented by Walter B. Zietz. Space 807.

Jones & Laughlin Steel Corporation, Pittsburgh, Pa.—Jalcase steel; J. & L. Jr. beams; concrete reinforcing bars; steel piling. Represented by George D. Branston, A. A. Wagner, J. D. Allen, T. C. Ham, William Miller, R. M. Kilgore, T. G. Roberts and Henry Dorney. Spaces 409 and 411.

Kant-Rust Products Corporation, Rahway, N. J.—Kant-Rust penetrating Graphite lubricant; hand, air spray and tank equipment for use with Kant-Rust. Represented by William F. Veech, V. F. Shafer and M. R. Shafer. Space 107.

K-G Welding & Cutting Company, Inc., New York.—Welding and cutting equipment. Represented by W. D. Flannery, P. Kearny, H. Munn, F. Leslie, P. Noren, J. W. Evans and R. Galloway. Space 781.

Keller, Inc., William H., Grand Haven, Mich.—Pneumatic hammers, drills, grinders, rammers and compression rivets; pneumatic tool accessories. Represented by Guy S. Warren, F. F. Lindgren, W. E. Hall, Ernest Shaff, J. B. Corby and W. J. Devlin. Space 153.

Kerite Insulated Wire & Cable Company, Inc., The, New York.—Kerite insulated wires and cables. Represented by J. W. Young, J. A. Hamilton, O. B. Frink, J. A. Renton, W. H. Fenley, C. M. Deardorff and E. L. Adams. Spaces 519 and 521.

Key-Bolt Appliance Company, Elmira, N. Y.—Car side demonstrating use of key bolts. Represented by Robert H. Peters and D. G. Anderson. Space 373.

Keyoke Railway Equipment Company, Chicago.—Friction draft gears; cast steel coupler yokes. Represented by R. J. Cook, G. W. Garrison and A. G. Williams. Space 309.

Keystone Grinder & Manufacturing Company, Pittsburgh, Pa.—Hand and motor power tool grinders and attachments. Represented by S. S. Newman and L. J. Cooney. Space 708.

Klasing Car Brake Company, Chicago.—Klasing lever type safety hand brakes; Klasing wheel type safety hand brakes. Exhibited in booth, and on demonstration car KCBX 600. Represented by A. F. Klasing, E. E. Morrison, Carrington Cabell, Frank Carlson, E. A. LeBeau and F. H. Van Sweringen. Space 379 and Track exhibit.

Landis Machine Company, Waynesboro, Pa.—Landis automatic forming and threading machine; Landis double head staybolt threading machine with reverse taper die head; Landex heads for automatic screw machines; Land-Matic heads for turret lathes; Lanco heads for threading machines; Victor collapsible taps. Represented by C. N. Kirkpatrick, F. C. Delcher, G. M. Stickell, John I. Davis and J. A. Cover. Spaces 815 and 817.

Lang Body Company, The, Cleveland, Ohio.—Steel and Duralumin bus on A. C. F. DeLuxe chassis. Represented by E. J. Lang and William C. Naegel. Spaces 859, 861 and 863.

Lebanon Steel Foundry, Lebanon, Pa.—Miscellaneous railroad castings. Represented by W. H. Worrilow, A. J. McDonald and P. E. Gerhard. Space 120.

Lehmann Machine Company, St Louis, Mo.—Oil groove milling machine. Represented by Paul Lehmann and A. H. Lehmann. Space 709.

Lehon Company, The, Chicago.—Smooth and slate surface roll roofings; asphalt shingles; waterproof insulating papers; house linings; sheathing papers; deadening felt; roof coatings and putty; built-up asphalt roofs; waterproofing asphalt; membranes; burlap felts; canvas coach roofings; burlap back car roofing; plastic car roofing; insulating papers; sill coverings; asphalt compounds. Represented by Tom Lehon, J. W. Shoop and F. T. Carpenter. Space 16.

Lewis-Shepard Company, Watertown, Mass.—Lift truck system for handling stores in transit. Represented by E. S. Pwers, P. F. Pernay and J. E. Freemann. Space 767.

Libbey Glass Manufacturing Company, The Toledo, Ohio.—Libbey high Pressure gage glasses; Libbey reflex glasses; Libbey bull's-eye glasses; Libbey lnatern globes; Libbey lenses. Represented by J. A. Carson. Space 536.

Link-Belt Company, Chicago.—Link-Belt silet chain for high speed drives; driving and conveyor chains; proof-tested RC roller chain with curled roller; Link-Belt Herringbone speed reducer (Sykes tooth form). Represented by J. S. Watson and R. S. Dyson. Space 146.

Locomotive Finished Material Company, The, Atchison, Kan.—Universal sectional packing rings; special steel pistons complete with universal bull ring and packing; Universal blow-off muffler. Represented by Clive Hastings, R. L. McIntosh and E. V. Lea. Space 90.

Locomotive Firebox Company, Chicago.—Nicholson thermic syphon. Represented by George R. Carr, Walter S. Carr, George N. DeGuire, A. A. Taylor, L. R. Pyle, C. A. Seley, C. M. Rogers and J. Baker. Spaces 382, 383, 384 and 385.

Long, Jr., Company, Chas. R., Louisville, Ky.—Panels displaying finishes for passenger and freight equipment—lacquers, varnishes, enamels and paints. Represented by Chas. R. Long, Jr., M. H. Oakes, J. M. Monroe, W. H. Heckman, J. S. Lemley, Samuel S. Demarest and A. G. Hollingshead. Space 579.

Lovell & Co., F. H., Arlington, N. J.—Lighting fixtures. Represented by A. D. Hobbie, J. C. Wylie and R. C. Schatzman. Spaces 631 and 633.

Lukens Steel Company, Coatesville, Pa.—Small samples and special tests of steel; photographs. Represented by R. W. Wolcott, E. H. Gordon, W. H. Warren, George Thomas, 3rd, G. T. Shants, F. L. Shants, W. H. Edgerley, H. G. Porch, W. H. Crampton, R. W. Ferguson, C. E. Naylor, J. F. Coburn, W. B. Harris, Breo LaPierre, G. D. Spackman, G. A. Cardwell, A. Cameron, W. G. Humpton, L. P. McAllister, A. Goodfellow, Harry Loeb and G. L. Gordon. Space 4.

Lunkenheimer Company, The, Cincinnati, O.—Valves; lubricators; oil and grease cups; other engineering appliances. Represented by H. J. Evans, Karl B. Litzelman and W. M. Hood. Spaces 529 and 531.

Mack-International Motor Truck Corporation, New York.—Specially designed motor truck for handling l. c. l. container bodies; specially designed bus for handling both passengers and express matter; six-cylinder bus chassis; double unit gas-electric rail car. Represented by C. S. McDonald, R. A. Hauer, H. A. Lorick and E. M. Post. Spaces 832, 833, 834, 835, 836 and 837.

MacLean-Fogg Lock Nut Company, Chicago.—M-F lock nuts No. 1; M-F speed holding lock nuts No. 2; M-F unit lock nuts No. 3. Represented by John A. MacLean, C. Beaumont, Aage Nilsen, J. W. Fogg, F. K. Shults and John A. MacLean, Jr. Spaces 370 and 371.

MacRae's Blue Book Company, Chicago.—Publication. Represented by Thomas H. MacRae, W. P. Dent, L. Simonson, Alex. Smith, C. S. Wallace and F. O. Rice. Space 17.

Madison-Kipp Corporation, Madison, Wis.—Madison-Kipp sight feed, adjustable, model HD locomotive lubricator; Madison-Kipp fluid pressure check valve for lubricating locomotive valves and cylinders; air pump; feedwater pump; booster; other locomotive accessories. Represented by Frank R. Clark and A. H. Flanagan. Space 364.

Manganese Steel Forge Company, Philadelphia, Pa.—Rol-Man manganese steel wear plates including journal box liners, pedestal face plates, bolster and transom chafing plates and draft gear wear plates; Rol-Man manganese steel brake pins, coupler knuckle pins, etc., A. R. A. pedestal type journal box with pedestal ways lined with Rol-Man manganese steel liners. Represented by L. W. Jones, Jr. and H. Howe. Space 330.

Massachusetts Mohair Plush Company, Boston, Mass.—Mohair plush for railroad equipment. Represented by Henry M. Bliss, A. B. Mason, W. W. Melcher, S. W. Midgley and R. W. Preikschat. Spaces 36 and 40.

Metal & Thermit Corporation, New York.—Samples of Thermit welds ranging from 4-in. by 4-in. sections to 10-in. by 10-in. sections; apparatus used in connection with making welds of this nature. Represented by William Aldrich, J. G. McCarty and Robert L. Browne. Space 140.

Micro Machine Company, Bettendorf, Iowa.—Model F. G. air pump grinder; model D. G. side rod grinder; micro link grinding attachment; micro frame-jaw milling machine; micro portable crank pin grinder. Represented by H. H. Yerk, H. H. Moor and H. T. Becke. Spaces 759 and 760.

Midgley & Borrowdale, Chicago.—Cleveland Tanning Company upholstery leathers; Textileather Corporation artificial leathers for upholstering seats, and for vestibule and window curtains; Protecto weather seal lock strip; Protecto metal bound felt weather stripping. Represented by S. W. Midgley, R. W. Preikschat, F. W. Wilhelmy and Albert Hoinke. Space 34.

Midland Company, The, South Milwaukee, Wis.—Midland combination safety stop and door hangers for baggage, express and postal cars; Midland box car door hangers; Wilbern adjustable door hangers for warehouse doors, train shed doors and station doors; McGahey door lock for hopper bottom cars. Represented by R. A. Nourse, C. P. Nourse and Howard P. Cook. Spaces 312-314.

Midway Railway Equipment Company, Chicago.—Konker hand brake; Midway adjustable retaining valve anchor; Brownie pipe clamps; draft gear carrier. Represented by L. J. Brown. Space 366.

Milar, Clinch & Company, Chicago.—Wolfe triple valve bushing grinder; Continental car cement and method of application. Represented by A. W. Gillespie, C. H. Broo, E. H. Hall, D. L. Clinch and K. A. Milar. Spaces 366 and 368.

Milburn Company, The Alexander, Baltimore, Md.—Oxy-acetylene welding and cutting torches; regulators; oxy-illuminating gas torches; acetylene generators; oil burners and preheaters; portable carbide lights; paint spray equipment. Represented by A. F. Jenkins and C. R. Pollard. Space 217.

Miner, Inc., W. H., Chicago.—Friction draft gears; friction buffing devices; spring draft gears; safety hand brakes; side bearings; refrigerator car door fasteners; bolster locking center pins, etc. Represented by W. H. Miner, A. E. Biddle, Bradley S. Johnson, G. Q. Lewis, J. H. Link, J. F. O'Connor, A. G. Peterson, W. E. Robertson, R. H. Weber, A. P. Withall, C. W. Woessner and George A. Johnson. Spaces 586 and 587.

Monarch Products Company, Red Bank, N. J.—Valve grinding compounds. Represented by W. E. Soper. Space 771.

Morton Manufacturing Company, Chicago.—Kass safety treads; aluminum and steel railway car doors; interior steel furnishings; Chanarch car flooring; tail gates; buffing mechanism; vestibule diaphragms; vestibule curtains; car window curtains, fixtures and rollers; window fixtures; Morton suggestion system. Represented by Charles D. Morton, Charles S. Motter, William M. Wampler, C. A. Koenig, G. H. Ord, C. H. Kadie, R. R. Gaines and H. B. Wilson. Spaces 570 and 571.

Morton Manufacturing Company, Muskegon Heights, Mich.—New Morton 32-in. stroke high-duty draw-cut shaper; new Morton Special draw-cut railroad planer; new Morton journal bearing finishing miller; new Superior plain type air hose couplings. Represented by Henry E. Morton, H. Earl Morton, Matt. H. Morton, George F. Goble and M. Frank Bliss. Spaces 802 and 804.

Murray Corporation of America, Detroit, Mich.—33-passenger Murlyte motor coach body, mounted on 239-in. wheelbase, C. H. Will chassis. Represented by Fred A. Wales, John McArdle and F. A. Selje. Spaces 842 and 843.

McConway & Torley Company, The, Pittsburgh, Pa.—Pitt pivoted passenger coupler with centering device and quadruple shear yoke; type D passenger coupler, similarly equipped; type D freight car and locomotive couplers; coupler for gasoline-electric cars. Represented by William McConway, Jr., I. H. Milliken, W. J. Regan, H. F. Dunbar, G. P. Ritter and Enoch George, Jr. Spaces 501, 503 and 505.

Nathan Manufacturing Company, New York.—Nathan mechanical locomotive lubricators; hydrostatic lubricators; locomotive injectors; boiler checks; water columns; low water alarms; water gages and water gage glasses; valves; gage cocks. Represented by Joseph F. Farrell, R. M. Dixon, Richard Welsh, F. C. Davern, R. H. Jenkins, W. R. Walsh, F. E. Marsh, D. L. Beattie, W. L. Barr, H. G. Cook, W. G. Lockwood, S. H. Dolan, W. S. Harris, T. J. Murphy and L. Kassander. Spaces 578 and 579.

National Bearing Metals Corporation, St Louis, Mo.—Chilled cast bronze crown bearings, back end main rod brasses, front end main rod brasses, floating bushings and knuckle pin bushings; self-oiling crosshead gibs; self-lubricating lateral plates; side-oiling trailer and truck brasses; standard journal bearings; gun bronze valve motion bushings; axle bearings for electric equipment; armature bearings for electric equipment; special grades of babbitt metals and solder. Represented by John B. Strauch, Alexander Turner, S. W. Crawford, Arthur N. Dugan, A. Y. Evins and W. H. Bies. Spaces 82, 84 and 86.

National Boiler Washing Company of Illinois, Chicago.—National hot water blow-off, washout and filling up system for locomotive boilers. Represented by Fred W. Gale and T. G. Dalton. Space 202.

National Brake Company, Inc., Buffalo, N. Y.—Geared hand brakes; several new types of Peacock brakes. Represented by Frank D. Miller and William D. Brewster. Space 304.

National Carbide Sales Corporation, New York.—National Carbide lantern for use of car inspectors signal and maintenance men; National carbide. Represented by W. C. Keeley, Jr., R. C. Holcomb and D. Anglada. Space 653.

National Lead Company, New York.—Dutch Boy red lead; Dutch Boy white lead; Dutch Boy solders and babbitts. Represented by F. M. Hartley, Jr., F. E. Dodge, A. H. Sabin and A. B. Tibbets. Space 79.

National Lock Washer Company, The, Newark, N. J.—Models of car window equipment. Represented by G. LaRue Masters, F. J. Gerhard, D. Hoyt and A. W. Preikschat. Space 539.

National Malleable & Steel Castings Company, Cleveland, O.—Draft gears; couplers for freight and pasenger equipment and engines; journal boxes; roller bearing truck; yokes; power hand brakes; hand brake castings; miscellaneous malleable and steel castings; automobile truck wheels. Represented by T. W. Aishton, A. J. Bazelev, C. K. Brooks A. O. Buckius, J. J. Byers, T. H. Doyle, G. R. Farrell, E. H. Fathauer, Charles Gaspar, H. W. Gilbert, J. F. Hutson, J. H. Jaschka, C. H. Krakau, F. K. LeVake, W. C. Lewis, C. H. McCrea, G. V. Martin, H. L. Mausk, F. E. Moffett, Benjamin Nields, Jr., George Rasmussen, D. Robinson, R. R. Root, E. H. Schmidt J. A. Shafer, E. V. Sihler, J. A. Slater, S. L. Smith, F. Snyder, Herbert Spence, R. M. Titgemeyer, E. O. Warner, R. Wittmer and L. S. Wright. Spaces 613 and 615.

National Pneumatic Co., New York.—Pneumatic door operating devices; door locks; door and train signal systems. Represented by R. S. Frehse, A. Frank Paul and J. H. Vander Veer. Space 730.

National Railway Appliance Company, New York.—Garland ventilators; Houdaille shock absorbers for railroad car generators; Economy power saving and inspection meters. Represented by B. A. Hegeman, Jr., H. A. Hegeman, J. M. Pratt, F. M. Richards, A. B. Kroeger, R. L. Cluverius, R. H. Stier and M. Garland. Space 622.

National Railway Devices Company, Chicago.—Shoemaker radial No. 2 firedoor; Shoemaker radial firedoor. Represented by E. J. Gunnison and Jay G. Robinson. Space E. Porch.

National Tube Company, Pittsburgh, Pa.—National scale free pipe; National tubular steel poles; National-Shelby seamless boiler tubes; National-Shelby seamless mechanical tubing. Represented by P. J. Conrath, J. M. Denney, J. E. Fleming, W. F. Jones, J. W. Kelly, R. J. McAuliffe, C. F. Roland, W. L. Schaeffer and O. G. Steiner. Spaces 74, 76, 78 and 80.

New York Brake Company, The, New York.—Reception booth. Represented by B. B. Greer, L. K. Silcox, J. D. Cartin, J. H. Watters, C. E. Leach, E. F. Wentworth, George Kleifges, B. Hyanes, H. A. Flynn, J. B. Brown and H. T. Wentworth. Space 30.

Nichols & Brother, George P., Chicago.—Nichols quick-acting bleeder attachment; two-wheel type turntable tractor; model of transfer table; duplex system of motor control. Represented by H. E. Notley and Bennett F. Goldman. Space 762.

Niles-Bement-Pond Company, New York.—Reception booth. Represented by W. P. Kirk, D. S. Woods, W. R. Mullinix, L. S. Horner, Harold F. Welch and L. S. Horton. Space 822.

Niles Crane Corporation, New York.—See Niles-Bement-Pond Company.

Niles Gear Company, New York.—See Niles-Bement-Pond Company.

Niles Tool Works Company, The, New York.—See Niles-Bement-Pond Company.

Nuttall Company, R. D., Pittsburgh, Pa.—Double reduction sneed reducer with motor and bedplate; single reduction speed reducer with motor and bedplate; Westinghouse-Nuttall drive; complete double shoe for Pantograph; display board of Nuttall gears. Represented by J. E. Mullen, R. S. Kratz and R. E. Fiske. Spaces 88 and 90.

Oakite Products, Inc., New York.—Oakite cleaning materials; demonstrations of paint removal. Represented by H. L. Gray, L. B. Johnson, E. Geh, J. A. Carter, A. A. Kopp and Guy Gregory. Space 830.

Ohio Brass Company, Mansfield, O.—Tight-lock A. R. A. car coupler. Represented by C. H. Tomlinson, W. J. Stanton, F. E. Johnson, A. L. Price and D. H. Moore. Space 328.

Ohio Injector Company, The, Chicago.—Low water alarm; mechanical-hydrostatic lubricator; rail oiler; standard T injector; standard T lever starting valve; standard T boiler checks; standard T intermediate checks; Chicago D-4 lubricator with auxiliary filler and multiple container; Chicago K-45 lubricator with 18-pt. auxiliary filler; Chicago automatic graduating drifting valve. Represented by William S. Furry, Frank W. Edwards, A. C. Beckwith, W. H. Malone, N. M. Barker and C. G. Sauerberg. Space 329.

Ohmer Fare Register Company, Dayton, O.—New Ohmer ticket office ticket printers; new Ohmer rapid ticket printer; New No. 80 type Ohmer ticket printing registers; Ohmer fare registers and fare boxes; Ohmer distance recording devices including Recordograf, Odometer and Hub-Odometer; Ohmer taximeters. Represented by H. B. Ohmer, I. F. Lutz, George F. Jacobs, R. T. Abrell, B. C. Palmer and L. P. Stickel. Spaces 723 and 724.

O. K. Tool Company, Inc., The, Shelton, Conn.—O. K. system of single point tool bits and holders for metal removing machines; inserted tooth milling cutters of special O. K. design, including inserted tooth face mills, hollow mills, counterbores, trepanning, etc.; new shankless tool bit and holder for heavy work, including rough turning of car wheels. Represented by Frederick J. Wilson, R. R. Weddell, Frederick Schroeder, J. C. Kaimer, H. E. French, W. N. Burns and W. B. Leonard. Space 824.

Okadee Company, The, Chicago.—Okadee front end hinge; Okadee automatic cylinder cocks; Okadee water glass protector; Okadee tender hose couplers for locomotives; Okadee blower and blow-off valves fro locomotive and stationary boilers; Okadee automatic drain valves for cylinder exhaust chambers, air pump exhaust, blower lines, etc. Represented by M. H. Oakes, W. H. Heckman, G. P. Dirth, T. S. Lemley, C. G. Learned, T. J. Melley, J. M. Monroe, A. G. Hollingshead and Chas. R. Long, Jr. Space 578.

Okonite Company, The, Passaic, N. J.—Okonite rubber covered wires and cables of all types, including car, locomotive, headlight, train control, signal, telegraph and telephone train despatching; steel taped lead sheathed cables to be buried in the ground; Okocord trouble-proof flexible cables; Okonite and Manson tapes; Okonite-Callender impregnated paper cables; Hazard shot-proof aerial cable. Represented by J. D. Underhill, W. R. Van Steenburgh, J. W. Hackett, A. L. McNeill, Ray Baker and F. J. White. Space 581.

Old Dominion Iron & Steel Works, Inc., Richmond, Va.—Old Dominion solid and hollow rolled staybolt iron; Old Dominion electric steel staybolts, solid and hollow. Represented by Thomas S. Wheelwright and George Brooks West. Space 633.

Oxweld Railroad Service Company, The, Chicago.—Reception booth. Represented by C. B. Moore, R. R. Browning, G. B. Walker, F. H. Haggerson, F. C. Hasse, William Leighton, J. G. Tawse, H. W. Schulze, E. S. Richardson, W. E. Cotter, M. C. Beymer, E. Cordeal, William Jones, W. A. Hogan, A. N. Lucas, G. M. Crownover, C. S. Wright, L. C. Ryan, J. L. Hoffman, E. M. Collins and Leslie Flood. Space 33.

Paige & Jones Chemical Company, Inc., New York.—Paige-Jones wayside tank method for locomotive boiler water treatment; Paige-Jones Zeolite water softeners. Represented by C. B. Flint, Fred O. Paige, R. E. Falkinburg and H. A. Brinsley. Spaces 374 and 376.

Paint Products Corporation, Philadelphia, Pa.—Drion freight car paint; small freight cars showing different applications of Drion paint. Represented by A. Pierce Gregg. Space 543.

Pantasote Company, Inc., New York.—Agasote headlining, wainscoting and roofs; Pantasote car curtain and seat material. Represented by William A. Lake, William Anderson, H. H. Horn and H. G. Mastin. Space 400.

Paxton-Mitchell Company, The, Omaha, Neb.—Metallic piston rod and valve stem packing; metallic air pump packing; hand power lathe; packing chucks for boring Paxton-Mitchell metallic packing. Represented by L. J. McConnell, H. J. Molloy and J. J. Keliher. Space 533.

Peerless Machine Company, Racine, Wis.—Peerless high speed metal sawing machines of both Standard and Universal types, from 4½-in. to 16-in. capacity; portable and stationary power pipe threading machines from ¼-in. to 2-in. capacity. Represented by Charles Rasmussen, R. T. Ingalls, I. M. Ward and A. H. Goetz. Space 814.

Pels & Company, Inc., Henry, New York.—Triple and quadruple combined punching and shearing machines; double housing eccentric press, 220 tons pressure; single housing eccentric press, 220 tons pressure; bar, angle and tee shear. Represented by T. C. Sternblad and E. E. Tailfer. Spaces 754 and 755.

Penn Iron & Steel Company, Creighton, Pa.—Samples of Lewis special staybolt iron; Lewis special hollow drilled headed and threaded staybolts; Lewis engine bolt iron; cold, nick and threaded bends; etch and pull tests of the above iron; iron furniture made from ¾-in. round Lewis special staybolt iron, bent cold. Represented by C. J. Nieman. Space 552.

Pilliod Company, The, New York.—Baker valve gear; locomotive cut-off control. Represented by Frank H. Clark, J. H. Cooper, J. J. Donovan, Frank Lutz, H. B. Snyder and R. H. Weatherly. Spaces 562 and 563.

Pilot Packing Company, Inc., Chicago.—Pilot packing; Pilot asbestos listing; Pilot flue brushes; Pilot brake lining; Pilot gaskets; Ripken valve. Represented by Joseph Sinkler and Robert Sinkler. Space 528.

Pittsburgh Steel Foundry Corporation, Glassport, Pa.—Lubricated center bearing truck bolster. Represented by C. W. Howat, John Allison, Joseph F. Leonard, H. V. Seth and J. R. Forney. Space 124.

Pittsburgh Testing Laboratory, New York.—Reception booth. Represented by James Milliken, Frederick V. Green and G. H. Lyons. Space 580.

Pocket List of Railroad Officials, The, New York.—Copies of the Pocket List of Railroad Officials. Represented by J. Alexander Brown, Harold A. Brown and B. J. Wilson. Spaces 11 and 13.

Pratt & Letchworth Company, Buffalo, N. Y.—Draft attachment castings; cast steel coupler yokes. Represented by A. M. Edwards. Spaces 584, 585, 586 and 587.

Pratt & Letchworth Company, Buffalo, N. Y.—Draft gear attachment; steel castings. Represented by Arthur M. Edwards. Spaces 584, 585, 586 and 587.

Pratt & Whitney Company, New York.—Reception booth. Represented by W. P. Kirk, D. S. Woods, W. R. Mullinix, L. S. Horner, Harold F. Welch and L. S. Horton. Space 822.

Pratt & Whitney Aircraft Company, Hartford, Conn.—Wasp engine. Represented by A. D. Gauss. Space 822.

Pressed Steel Car Company, Pittsburgh, Pa.—Triplex articulated passenger car; 30-yd. low type drop side air dump car; refrigerator car; reception booth. Represented by J. F. MacEnulty, N. S. Reeder, H. P. Hoffstot, F. O. Schramm, C. E. Postlethwaite, H. H. Gilbert, C. C. Clark, F. L. Johnson, J. S. Turner, W. H. Wilkinson, H. S. Hammond, J. G. Morrissey, C. H. Jackman, C. P. Mapp, F. H. Freshwater, M. C. Blest, W. W. Stewart and H. I. Clark. Spaces 545 and 601, and on track.

Production Machine Company, Greenfield, Mass.—Production polishing and finishing machinery. Represented by W. S. Howe, A. H. Behnke and Leon S. Kinsman. Space 712.

Pyle-National Company, The, Chicago.—Turbo-generators for locomotive headlighting, head end train lighting and automatic train control; headlight cases in cast and sheet metal; Oliver wiring appliances, including classification lamps, marker lamps, headlight switches, fuse boxes, safety first switches, conduit couplings, conduit unions and cab light fixtures; model locomotive wiring set-up; floodlights; Duplex valve. Represented by J. Will Johnson, Sr., William Miller, J. A. Amos, C. P. McGinnis, A. N. Martin, E. H. Hagensick, G. E. Haas, J. J. Kennedy, Carl S. Geis, G. V. Wright, W. Smith, W. A. Ross, J. L. Reese and P. S. Westcott. Spaces 602, 604, 606 and 608.

Pyrene Manufacturing Company, Newark, N. J.—Hand fire extinguishers. Represented by J. P. Maloney. Space 729.

Q & C Company, The, New York.—Nogroth metal grate bars; unlimited travel roller side bearings; emergency knuckles No. 33 and No. 37. Represented by Godwin Shenton, H. T. Henry, L. T. Burwell and E. R. Packer. Space 630.

Quigley Furnace Specialties Company, Inc., New York.—Triple-A solution (protective coating); Monolithic baffles; Quigley refractory gun; motion picture on Hytempite (high temperature cement). Represented by W. S. Quigley, W. H. Gaylord, M. F. King and H. M. Miller. Spaces 109 and 111.

Railroad Herald, The, Atlanta, Ga.—Reception booth. Represented by E. C. Laird. Space 626.

Railway Devices Company, St. Louis, Mo.—Western angle cock holders; Top Notch forged steel wedges; Iron Horse car pedestals; Real forged brake jaws; Sta-Rite coupler releases. Represented by Louis A. Hoerr, Sterling Campbell and Roland M. Hoerr. Space 618.

Railway Purchases and Supplies, Chicago, Ill.—Magazines. Represented by W. H. Dickinson, J. P. Murphy, Jr., Edward Wray, H. B. Kirkland, K. F. Sheeran and George G. Yeomans. Spaces 19 and 21.

Railway Service & Supply Corporation, Indianapolis, Ind.—Journal box packing reclamation process. Represented by E. S. Pearce and L. D. Grisbaum. Spaces 562 and 563.

Ralston Steel Car Company, The, Columbus, O.—Reception booth. Represented by F. E. Symons, B. C. Hanna, C. O. Rea, F. A. Livingston, F. M. Cowgill, C. L. Fox and O. K. Schurtz. Space 558.

Reading Chain & Block Corporation, Reading, Pa.—Chain hoists; electric hoists; traveling cranes; monorail systems. Represented by F. H. Howard, F. A. Howard, P. K. Howard, L. W. Lutz and E. I. Huff. Space 728.

Reading Iron Company, Reading, Pa.—Staybolt iron; engine bolt iron; black and galvanized wrought iron pipe and nipples. Represented by J. K. Aimer, Donald Charlton, G. H. Woodroffe, Harry Shepard, David Thomas and C. T. Ressler. Space 91.

Rekeen Tool Company, Inc., Balitmore, Md.—Space 37.

Reliance Machine & Stamping Works, Inc., New Orleans, La.—Spee-D high pressure grease appliances for locomotive connecting rod lubrication; Spee-D high pressure terminal grease gun; Spee-D high pressure road grease gun; Spee-D connecting rod fittings. Represented by E. B. Norman, H. C. Manchester and G. A. Pettit. Space 307.

Remington Rand Business Service, Inc., New York.—Service booth where complimentary stenographic service will be rendered to members and guests. Represented by H. D. Hedlund, Mrs. H. D. Hedlund, H. W. Buse, R. A. Dennis and J. A. Rogers. Space 4-A.

Robinson Connector Company, New York.—New Robinson automatic air and steam hose connector. Represented by R. M. Wolvin, Joseph Robinson, J. H. Rogers and G. E. Matheson. Spaces 317 and 319.

Roebling's Sons Company, John A., Trenton, N. J.—Wire rope and wire; welding wire; wire rope slings; wire rope fittings; insulated wires and cables; wire cloth; rail bonds; bell or signal cord; alligator wrenches; parallel wire suspension cable; telegraph wire; telephone wire; copper wire; caboose cables. Represented by F. J. Maple, H. E. Thorn, A. L. Miller, G. W. Swan, A. E. Gaynor, J. L. Unsworth, E. T. Bertram, J. W. Whelan, D. T. Brown, A. D. Clarkson, J. E. Nolan and J. F. Berger. Space 147.

Rogatchoff Company, The, Baltimore, Md.—Improved Rogatchoff adjustable crosshead. Represented by Theodore Rogatchoff. Space. A.

Rome Iron Mills, Inc., New York.—Rome Superior staybolt iron; Rome Perfection enginebolt iron. Represented by C. C. Osterhout. Spaces 414, 416, 422 and 424.

Rooksby & Co., E. J., Philadelphia, Pa.—Crank pin turning machines; cylinder boring bar; valve chamber boring bar; cylinder flange facing machine; valve seat rotary planing machines. Represented by Edwin J. Rooksby and Jesse G. Haydock. Space 803.

Royal Railway Supply Company, Inc., New York.—Brake regulators; hand brakes; turnbuckles. Represented by Charles M. O'Boyle, W. H. Sauvage, George W. Bender and Charles H. Quinn. Space 122.

Ryerson & Son, Inc., Joseph T., Chicago.—Lewis engine bolt iron; Lewis special staybolt iron; Lewis special hollow drilled staybolts; Glasgow double refined rolled wrought iron billets. Represented by W. S. Campbell, A. M. Mueller, J. P. Moses and A. W. Willcuts. Space 552.

S K F Industries, Inc., New York.—Engine truck equipped with S K F journal bearings; other heavy duty applications of S K F anti-friction bearings in industrial fields. Represented by W. L. Batt, H. E. Brunner, B. W. Taylor, E. M. Harshbarger, T. E. Rounds, Jr., M. F. McNay, R. C. Byler and R. H. DeMott. Spaces 114, 116 and 118.

Safety Car Heating & Lighting Company, The, New York.—Safety car-lighting electric generators, regulation, switchboards, lighting fixtures and fans; battery charge controls and lamp regulation for rail motor cars and electric locomotives; Iceless refrigerator cars. Represented by W. L. Conwell, J. H. Rodger, H. K. Williams and C. W. T. Stuart. Space on stairway pavilion and on track.

Safety Equipment Service Company, The, Cleveland, O.—Super-Drednaut goggles; respirators; Safety Service shoes, safety clothing, gloves, leggings, etc., made from F. P. duck, chrome leather and asbestos; sand blast helmets; aprons; first aid supplies; ladder shoes. Represented by B. W. Nutt. Space 322.

St. Louis Car Company, St. Louis, Mo.—Gas-electric train built for Mobile & Ohio Railroad; photographs of passenger cars and gas-electric rail cars. Represented by Edwin B. Meissner, George L. Kippenberger, H. R. Gass, N. L. Rehnquist, L. F. Seelar, Thomas Branch, L. W. Richards, N. W. Eagles and Morrison J. Oswald. Space 362. and on track.

Sargent Company, Chicago.—Sargent water columns with three-face gage; water glass cocks; two-seat gage cocks; Ironclad water glass protectors; Sargent safety gaskets; Loedige blower valves; Sargent steam and pressure gages; Mercury type electric float switches. Represented by Louis L. Schultz and G. S. Faber. Space 600.

Schaefer Equipment Company, Pittsburgh, Pa.—Drop forged truck lever connections; truck levers; brake rod jaws; brake beam hangers; brake beam hanger suspensions. Represented by F. A. Barbey, W. E. Cade, Jr., H. G. Doran, T. F. Dwyer, Jr., S. M. Hindman and E. J. Searles. Spaces 511 and 513.

Scientific Production Corporation, New York.—Paint and standard unit lock nuts. Represented by A. C. Moxey and H. A. Paarman. Space 727.

Scullin Steel Company, St. Louis, Mo.—Scullin-Dalman 70-ton truck; one half of Scullin-Dalman truck side frame, cut on longitudinal center line; sectional view of Scullin-Dalman truck side frame, outer half removed. Represented by Albert J. Davis, W. L. Jefferies, Jr., N. S. Kenney, Brownrigg L. Norton, Frank L. Norton, A. O. Woerner, E. S. Wortham and George S. Chiles. Space 228.

Scully Steel & Iron Company, Chicago.—Campbell nibbler; Draper flue welder; Scully boring and turning bars; Wiedeke tube expanders and tube cutters; boiler shop tools. Represented by A. D. F. Simmons, E. E. Stockum and Stuart Naramore. Space 311.

Sellers & Co., Inc., William, Philadelphia, Pa.—Locomotive injectors and accessories. Represented by Edward L. Holljes, John D. McClintock, James R. New, Philip E. Raymond and Alexander Sellers, Jr. Space 627.

Shaw, Crane-Putnam Machine Company, Inc., New York.—Reception booth. Represented by C. A. Moore, Jr., Frank J. Baumis, A. P. Afanassieff and W. O. Foreman. Space 636.

Sherwin-Williams Company, Philadelphia, Pa.—Reception booth. Represented by Arthur Larkins, C. P. Jarden, A. H. Kennedy, C. R. Jarden, John Schlintz and F. A. Elmquist. Spaces 213 and 215.

Simmons-Boardman Publishing Company, New York.—Railway Age; Railway Mechanical Engineer; Railway Electrical Engineer; Railway Engineering and Maintenance; Railway Signaling; Marine Engineering and Shipping Age; The Boiler Maker; The Slipstream; Car Builders' Cyclopedia; Locomotive Cyclopedia; Maintenance of Way Cyclopedia; books on transportation subjects. Represented by E. A. Simmons, S. O. Dunn, Roy V. Wright, C. B. Peck, E. L. Woodward, R. C. Augur, H. C. Wilcox, M. B. Richardson, L. R. Gurley, J. C. Emery, D. A. Steel, H. B. Foster, A. G. Oehler, C. J. Corse, A. E. Ortlinghaus, E. A. Rehm, L. Milner, L. B. Sherman, Henry Lee, C. R. Mills, F. H. Thompson, George Slate, F. C. Koch, J. G. Little, R. E. Thayer, J. M. Rutherford, F. J. Fischer, J. E. Gougeon, R. F. Duysters, H. E. McCandless, J. E. Anderson and C. Packard. Spaces 1 and 3.

Simonds Saw & Steel Company, Fitchburg, Mass.—Metal cutting saws; files; hack saw blades; grinding wheels. Represented by R. D. Baldwin and H. B. McDonald. Space 810.

Simplex Wire & Cable Company, Boston, Mass.—Tirex train control wire; railway utility cable for battery jumpers, generator leads and train connectors; electrode holder cable; welding cable; electromagnet cable; charging cable; rivet heater cable; truck charging cable; portable equipment cable; portable cords; Cambrex locomotive headlight wire; cab cord; Condex underground cable; Simplex railway coach wire; aerial cable for overhead outside distribution. Represented by C. J. Zeigler, J. G. Brobeck, J. E. Ham, W. H. LaMond, G. L. Roberts and F. H. Pettee. Space 610.

Smith & Sons, Inc., David H., Brooklyn, N. Y.—92-20 triple combination Sontag punch and shear; 91-16 quadruple combination Sontag punch and shear; 91-11 quadruple combination Sontag punch and shear; new type pressed steel steps. Represented by William Krapohl, Dudley J. Smith, David H. Smith, Karl Germer, Austin Smith and George Rushmore. Space 711.

Smith Heater & Manufacturing Company, Peter, Detroit, Mich.—O-C-2-A heater; new type heater and equipment in operation; skeleton heater. Represented by E. J. Smith, E. O. Merline, R. E. Lawrence and M. W. Eastwood. Space 756.

Southern Wheel Company, New York.—Chilled tread car and tender wheels. Represented by William F. Cutler, Frank C. Turner, J. B. Spencer, S. C. Watkins, O. W. Spencer, H. S. Russell, C. M. Bower, A. H. Elliot, C. C. Cox and S. F. Pryor, Jr. Spaces 508 and 510.

Special Bolt Machinery Corporation, New York.—Semi-automatic valve finishing machine for air brake equipment. Represented by Walter H. Foster and H. L. Kenah. Space 803.

Standard Auto-Tite Joints Company, Pittsburgh, Pa.—Two-in. all-metal pipe connection with Auto-Tite flexible ball joints for steam heat pipe line between passenger cars; flexible ball joints, straight, single-angle and double-angle for air, steam water and oil; Auto-Tite Flexadjusto joints; Auto-Tite rotary joints. Represented by Norman Allderdice, Lucian C. Brown and A. M. Frauenheim. Space 204.

Standard Car Truck Company, Chicago.—36 models of car trucks and full sized parts. Represented by Lee W. Barber, James T. Milner, F. L. Barber, E. W. Webb, R. E. Frame and A. C. Deverell. Space 502.

Standard Coupler Company, New York.—Draft gears; buffers; side bearings. Represented by Douglas I. McKay, E. G. Goodwin, George N. Orr, A. D. Morrow, J. M. Welles and R. D. Gallagher. Space 500.

Standard Oil Company of Louisiana, New Orleans, La.—Cooling compound; hub plate grease; driving journal compound H; graphite rod cup grease; rod cup grease H; center plate grease; stoker grease; electric car gear grease; external gear grease; No. 4 Acme grease; No. 3 Matchless grease; angle valve grease; air brake compound; pressure gun grease; railroad valve oil, superheat; railroad valve oil, superheat B; railroad valve oil, saturated; railroad car and engine oil; gas engine oil; motor oil, medium, heavy, heavy X and heavy XX. Represented by H. C. Ferrell and Hugh Bonham. Spaces 300 and 302.

Standard Oil Company of New Jersey, New York.—Rolling stock lubricating oils and greases. Represented by W. E. Walsh, R. A. Greene, F. C. Langdon, G. W. Tullis and E. D. Sheffe. Spaces 300 and 302.

Standard Oil Company of New York.—Space 761.

Standard Railway Equipment Company, Chicago.—Dreadnaught steel ends for gondolas and box cars; solid steel roofs; radial all-steel flexible roofs; pivoted all-steel flexible roofs; improved pivoted outside metal roofs; ZU carlines; Ajax corrugated doors; Union centering device; Garmer improved coupler release rigging; Imperial type B coupler release rigging; National side doors. Represented by A. A. Frank, S. G. Rea, D. R. Arnold, A. S. Merz, J. T. Cralley, J. H. Schroeder, E. G. Fredell, J. E. Clyde and G. G. Gilpin. Space 402.

Standard Steel Works Company, Philadelphia, Pa.—Second oldest microscope used in this country for industrial work, with various test pieces of carbon and alloy steels for showing with this machine; charts and

microscopic photographs of forgings. Represented by A. J. Beuter, A. S. Goble, C. E. Hale, J. F. Hoerner, W. B. Keys, Latham McMullin, F. K. Metzger, L. W. Metzger, Jr., Charles Riddell and R. N. Watt. Space 625.

Standard Stoker Company, Inc., The, New York.—Duplex D-3 stoker; Standard type B stoker; Standard B-K stoker; slope sheet coal pusher. Represented by W. C. Peyton, F. C. Pickard, A. M. Hunt, D. F. Crawford, F. P. Roesch, W. S. Bartholomew, R. J. Schlacks, A. L. Whipple, H. S. Mann, W. D. Gray, M. C. M. Hatch, G. M. Myers, C. A. Binney and H. P. Anderson. Spaces 403, 405 and 407.

Starrett Company, The L. S., Athol, Mass.—Micrometers; gages; calipers; dividers; protractors; steel rules; squares; test indicators; hack saw blades; hack saw frames; steel tapes; vises. Represented by D. Findlay, A. H. Starrett, D. Moffat, W. J. Greene and H. E. Masters. Space 85.

Stearns-Stafford Roller Bearing Company, Lawton, Mich.—Roller bearings for passenger cars; roller bearings for turntables. Represented by O. F. Packer and H. E. Notley. Space 762.

Straw Ballast Distributor Corporation, New York.—Reception booth. Represented by A. C. Moxey and H. A. Paarman. Space 727.

Stucki Company, A., Pittsburgh, Pa.—Roller side bearings removed from cars to show conditions after various periods of service. Represented by A. Stucki, A. B. Severn and William C. Hansen. Space 537.

Studebaker Corporation of America, The, South Bend, Ind.—22-passenger Seminole parlor car; 21-passenger street car; new Reading Railroad bus equipment; "75" heavy duty chassis. Represented by Charles H. Wondries, Paul H. Castner, H. V. Loveland, C. H. Miller, R. H. Wisbach, R. B. Van Dyke, C. E. Yeatman and George Sherman. Spaces 838, 839, 840 and 841.

Sullivan Machinery Company, Chicago.—Sullivan angle compound air compressor, direct connected to a 25-hp. synchronous motor (in operation); Sullivan vertical type direct-connected motor driven compressor; horizontal straight-line single-stage WG-6 Sullivan compressor; single drum compressed air hoist, type HA-3; Sullivan double drum electric portable hoist, type HDE-2. Represented by Howard C. Sargent, E. F. Pie, L. R. Chadwick, E. L. Thomas and Oscar R. Cundy. Space 812.

Sunbeam Electric Manufacturing Company, Evansville, Ind.—Headlights; turbo-generators; cab fittings; dual voltage turbo-generator; headlight accessories. Represented by J. Henry Schroeder, C. W. Marshall, W. T. Manogue, C. E. Kinnaw and L. C. Richardson. Spaces 321 and 323.

Superheater Company, The, New York.—Elesco feedwater heater; Elesco exhaust steam injector; Elesco superheater unit repairs; Elesco superheated steam pyrometer; American multiple throttle. Represented by G. L. Bourne, F. A. Schaff, R. M. Ostermann, G. E. Ryder, H. B. Oatley, C. H. True, C. A. Odell, H. B. Brown, Bard Browne, N. T. McKee, R. R. Porterfield, E. A. Averill, George Fogg, R. J. Van Meter, A. C. McLachlan, W. A. Buckbee, C. A. Brandt, J. K. Scott, C. R. Hardy, Bert Smith, L. H. A. Weaver and J. F. Shanahan. Spaces 422 and 424.

Swind Machinery Company, Philadelphia, Pa.—New type Gray sheet metal cutter; high duty drilling machine. Represented by L. H. Swind, W. J. Powers and G. Helling. Space 821.

Symington Company, The, New York.—Farlow draft attachments with Symington swivel butt couplers on power demonstrating machine, reproducing service conditions; journal boxes; journal box lids; swivel butt couplers; miscellaneous malleable iron castings; miscellaneous electric steel castings. Represented by C. J. Symington, J. A. Sauer, R. H. Gwaltney, Hynes Sparks, Bruce M. Jones, A. E. Heffelfinger, M. M. Llera, J. A. Cameron, C. R. Naylor, H. K. Smith, R. T. Knapp, A. G. Brandenburg, I. O. Wright and W. J. Roehl. Spaces 134, 136 and 138.

T-Z Railway Equipment Company, Chicago.—T-Z boiler washout and arch tube plugs; T-Z front end blower nozzles; T-Z smoke preventer nozzles; T-Z automatic drain valves; Eclipse force and sight feed lubricators; Graham-White sanders and sand spreaders for locomotives and rail cars. Represented by G. S. Turner. Space 542.

Talmage Manufacturing Company, The, Cleveland, O.—Cleveland float low water alarm; Talmage ash pan; Talmage blow-off valve; Talmage hand brake. Represented by Frank M. Roby and Alfred F. Letherer. Spaces 354 and 356.

Textileather Corporation, Newark, N. J.—Artificial leathers for upholstering seats and for vestibule and window curtains. Represented by J. D. Lippman, G. H. McGreevy, S. W. Midgley and R. W. Preikschat. Space 34.

Thorn Company, J. S., Philadelphia, Pa.—Burnett vertical lift steel door; casement windows; plate double hung windows; industrial pivoted windows. Represented by H. M. Vetterlein, A. L. Doering and J. Allinson. Space 776.

Timken-Detroit Axle Company, The, Detroit, Mich.—Timken worm gear driving units of from ½-ton to 7½-ton capacity; front and rear motor coach axles; set of worm gearing that has traveled 585,000 miles under a motor coach. Represented by H. W. Alden, P. W. Hood, G. E. Fox, William Bonn, R. S. Gay, G. E. Watts, W. L. Love, C. S. Dahlquist, C. E. Hoffer and P. W. Sloan. Spaces 725 and 726.

Timken Roller Bearing Company, The, Canton, O.—Timken tapered railroad bearing for passenger cars, freight cars, locomotive tenders and locomotive engine trucks; model showing one of the C. M. & St. P. Timken-equipped trains; "cut-out" passenger car bearing showing working parts of the bearing; general bearing display; a bearing which has made over a half million miles. Represented by H. H. Timken, M. T. Lothrop, H. J. Porter, T. V. Buckwalter, W. C. Sanders, M. S. Downes, W. L. Campbell and J. W. Spray. Spaces 133 and 135.

Truscon Steel Company, Youngstown, Ohio.—Space 778.

Tuco Products Corporation, New York.—Tuco Flexolith composition flooring; Tuco Rockwul insulation for tank cars, lagging for locomotives, jacket insulation for passenger cars, and pipe insulation; Tucork insulation for car floors; Tuco Resisto hairfelt insulation; Tuco National standard treated canvas roofing; Tuco car window screens; Tuco trap doors; Tuco sash balances; Tuco deck sash ratchets. Represented by D. W. Pye, H. B. Chamberlain, R. F. O'Leary, T. L. Miller, C. M. Schramm, C. H. Kadie, R. Gaines, H. B. Wilson, F. A. Barbey, W. H. Byrnes and E. J. Corcoran. Space 547.

Twin Coach Corporation, Kent, Ohio.—Twin Coach parlor car. Represented by F. R. Fageol, J. Allan Smith, Ross Schram and E. S. Rider. Spaces 772 and 773.

Tyler Tube & Pipe Company, The, Washington, Pa.—Samples of boiler tubes. Represented by E. Tyler Davis, John H. Wallace, W. H. S. Bateman, George W. Denyven and J. R. Wetherald. Space 541.

Ulster Iron Works, Dover, N. J.—Ulster special solid and drilled hollow wrought iron staybolts; deep tell-tale hole radial staybolts; Ulster wrought engine bolt iron for frame bolts, cylinder studs, etc.; etched specimens disclosing results of tests; Ulster wrought iron rivets; Ulster cylinder studs. Represented by Henry T. Bradley, E. W. Kavanagh, C. F. Barton and John H. Craigie. Space 97.

Underwood Corporation, H. B., Philadelphia, Pa.—Direct connected driving power with boring bar attached; new valve chamber boring bar for locomotives; pedestal milling machine; locomotive cylinder or dome facing machine; two types of crank pin turning machine; centre crank pin turning machine for re-turning centre crank pins on three-cylinder locomotives; air compressor cylinder boring bar. Represented by F. H. Schonberger. Space 808.

Union Asbestos & Rubber Company, Chicago.—Packings; car insulation; brake lining; Insutape and Super Insutape; general asbestos materials. Represented by L. L. Cohen, J. H. Kuhns, W. R. Gillies, O. H. Neal and G. J. Martin. Space 324.

Union Carbide Sales Company, New York.—Oxweld railroad lamps, No. 2155, and Union Carbide model A lamps, for car inspection and general railroad inspection uses. Represented by H. E. Meagher, G. H. Lindsay and J. J. Saelens. Space 77.

Union Draft Gear Company, Chicago.—Cardwell friction draft gears. Represented by J. R. Cardwell, L. T. Canfield, J. E. Tarelton, C. J. Gorman, J. A. King, R. W. Schulze, W. Eckels, O. C. Heckart, R. H. Owens, J. W. Bridge, C. A. Danielson, A. Lerch, Frank E. Schmitz, W. G. Krauser and C. Carmichael. Spaces 413 and 415.

Union Metal Products Company, Chicago.—See Standard Railway Equipment Company.

Union Railway Equipment Company, Chicago.—"Ureco" high power hand brakes; "Ureco" drop brake shafts for flat and drop-end gondola cars; "Ureco" vertical wheel hand brakes; "Ureco" non-club hand brake wheel; "Ureco" weatherproof ratchet and pawl arrangement; "Ureco" self-locking refrigerator car door hinges; "Ureco" refrigerator car brine tank specialties; "Ureco" pressed steel well traps for refrigerator cars; "Ureco" coupler release rigging. Represented by A. F. O'Connor, J. A. Galligan and H. H. Moffitt. Space 621.

Union Spring & Manufacturing Company, Pittsburgh, Pa.—Reception booth. Represented by H. C. Bughman, Jr., J. W. Chandler, W. L. Jefferies, Jr., N. S. Kenney, W. F. McCabe, A. Pancoast, F. E. Schaeffer, D. R. Warfield, A. C. Woods and L. G. Woods. Space 559.

Union Tank Car Company, Chicago.—Tank car with tubular underframe. Represented by Abram E. Smith and Joseph J. Root, Jr. Space on track.

United Engineers & Constructors, Inc., Philadelphia, Pa.—Photographs of construction work. Represented by C. H. Crawford, H. H. Kerr and F. H. McGraw. Space 316.

United States Rubber Company, New York.—Reception booth. Represented by George A. Gardner, L. S. Hungerford, Jr., A. E. Waugh, F. E. Dodson, R. B. Smith and A. B. Means. Space 7.

Universal Draft Gear Attachment Company, Chicago.—Hand brakes for freight and passenger cars; friction bolster spring; super draft rigging; slack adjuster for freight car brakes; truck column anchors; cast steel yokes and draft lugs. Represented by C. J. Nash, C. C. Kinsman, J. M. Hall, H. I. Wrigley, P. B. Camp, H. E. Bartsch and W. G. Krauser. Spaces 507 and 509.

Universal Packing & Service Company, Chicago.—Spring journal box packing. Represented by John P. Landreth, George H. Green, W. H. Davis and J. D. Herr. Space 95.

Universal Packing Corporation, Pittsburgh, Pa.—Durametallic packing for use on locomotive throttles, cab valves, air pumps, reverse gears, main distributing steam valves, and for power house machinery; wheel machining apparatus for reducing high flanges and rolled out treads on locomotive tires. Represented by J. J. McQuillen, Herbert Lewis and C. C. Hall. Space 89.

Van Dorn Electric Tool Company, Cleveland, Ohio.—Portable high frequency drills, screw drivers, tappers, grinders and flexible disk grinders; direct-current portable reamers and drills; universal portable drills, grinders, screw drivers and tappers; electric socket wrench; Flex-Disc grinders; automotive engine valve refacing and reseating equipment. Represented by L. F. Hunderup, L. L. Charnicky and E. W. Whitman. Space 809.

Vanadium Corporation of America, New York.—All-metal three-blade airplane propeller with Chrome Vanadium steel hub; airplane propeller hub forgings and finished hubs; Chrome Vanadium steel; ferro alloys. Represented by Ward A. Miller, J. Alfred Miller, Jr., C. B. Woodworth and G. L. Norris. Spaces 12 and 14.

Vapor Car Heating Company, Inc., Chicago.—Steam heating specialties of all kinds; Vapor system and automatic temperature regulation with new unit control equipment; two-inch steam train line equipment; hot water heating specialties; fin-type radiation for gas-electric and other cars; flexible metallic joints for yards and stations; anti-freeze drip fittings, steam traps, shut off and drain valves; ventilators. Represented by Egbert H. Gold, J. E. Buker, A. D. Bruce, R. P. Cooley,

H. F. Lowman, E. A. Russell, W. L. Garland, N. F. Burns, L. H. Gillick, J. T. Clark, L. B. Rhodes, W. H. Tucker, C. E. Lowell, A. F. Retta, J. Convery and P. B. Parks. Spaces 208, 210, 212, 214 and 216.

Viloco Railway Equipment Company, Chicago.—Viloco improved sander; Viloco vacuum type bell ringer; Viloco exhaust pipe for locomotives; Viloco floating journal bearing and hub liner combined, for engine trucks, driving boxes, trailer and tender trucks; Viloco pneumatic whistle operator; Viloco grease lubricator for valve stem, piston rod and air pump; Viloco brake booster; Viloco pressed steel brake step. Represented by M. H. Oakes, W. H. Heckman, G. P. Dirth, J. S. Lemley, C. G. Learned, J. J. Melley, J. M. Monroe, A. G. Hollingshead and Chas. R. Long, Jr. Spaces 576 and 577.

Walworth Company, Boston, Mass.—Walworth Master Stillson wrench with special arrangement for testing; Walworth brass valves; Walworth Kewanee unions; standard and extra heavy malleable iron fittings. Represented by W. C. Mattox, Phillip B. Miller, E. S. Rawson, Jr. and William J. Moran. Space 412.

Wappat Gear Works, Pittsburgh, Pa.—Alta portable electric hand tools, including saws, planes and mortisers; three sizes of saws with cutting capacities ranging from 0 to 4½ in., equipped with patented safety guard. Represented by F. W. Wappat and Robert D. Vough. Space 819.

Watson-Stillman Company, The, New York.—"Wasco" four-screw electric drop pit table; 30-ton hydro pneumatic pit jack with air engine pump; 75-ton hydro screw jack. Represented by Edwin A. Stillman, H. J. Hair, W. B. Updegraff, H. D. Nitchie, W. J. Waters, J. Kerr, C. Wigtel and L. R. T. Brown. Space 706.

Waugh Equipment Company, New York.—Draft gears; platform buffers; centering devices; side bearings; outlet valves; testing machinery; hand straps. Represented by A. J. Pizzini, R. J. O'Brien, R. C. Munro, H. N. Ransom, W. M. Roche, C. C. Lange, H. D. Page, L. M. Clark, J. L. Boatwright, J. J. O'Fallon, E. Schroeder and W. H. S. O'Brien. Space 142.

West Disinfecting Company, Long Island City, N. Y.—Liquid soap and dispensers; latest gravity system for passenger coaches, stations and offices, attached to wash bowl; paper towel vending machine; paper towels; cabinets; liquid disinfectant; liquid deodorants; automatic drip and evaporating machines; sprayers. Represented by H. E. Daniels, E. C. Daniels and C. P. Williams. Space 26.

Westcott Valve Company, East St. Louis, Ill.—Hutchings outlet valves for tank cars; Hutchings non-freezing valves. Represented by Joseph L. Hutchings. Space 771.

Western Railway Equipment Company, St. Louis, Mo.—Interlox floor clips; Unitary retainer valve holders; Sure-Lox draft key retainers; Simple pipe clamps; Interlox brake shaft ratchets; Real placard holder; Fixit coupler lock lifter adjuster. Represented by Louis A. Hoerr, S. H. Campbell and Roland M. Hoerr. Space 618.

Western Tool & Manufacturing Company, The, Springfield, O.—Expanding mandrels; toolholders; emery wheel dressers; shop furniture. Represented by Henry Morris and David Morris. Space 628.

Westinghouse Air Brake Company, Wilmerding, Pa.—Air brake apparatus; demonstrations of brake cylinder protectors and rust-proof hose couplings; sectioned air brake parts illustrating intricate coring; aluminum brake cylinders for passenger cars; welded reservoirs; automotive brakes for buses, trucks and automobiles. Represented by S. G. Down, G. W. Wildin, C. R. Ellicott, C. J. Olmstead, Robert Burgess, E. W. Davis, H. S. Clark, J. B. Wright, C. D. Foltz, H. B. Gardner, J. F. Craig, C. C. Farmer and J. C. McCune. Spaces 27, 29 and 31.

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.—Latest type planer motor and control; demonstration of new cog belt utilizing a. d. c. and a. c. motor; Westinghouse-Beardmore oil engine with parts; Westinghouse-Nuttall gears; new Westinghouse welder; frequency changer; safety switches; linestarters; bus speed indicator; portable instruments; floodlights; small motors. Represented by A. I. Manson, T. C. Wurts, C. B. Stainback, J. E. Mullen, R. W. Young, A. H. Candee, S. B. Cooper, F. E. Wynn, Thomas Cooper, R. H. Kilner, T. R. Langan and L. C. Paul. Spaces 23, 25, 88, 90, 92, 94, 96 and 98.

Westinghouse Friction Draft Gear Company, Wilmerding, Pa.—N-11-A and NY-11 Westinghouse friction draft gear. Represented by S. G. Down and G. W. Wildin. Space 100.

Weston Electrical Instrument Corporation, Newark, N. J.—Electrical measuring instruments of all types applicable to routine test work; first showing of a complete railroad speed indicater which is a redesign of the Weston model 44 electric speed indicator; special voltmeter and headlight tester; selective AC ammeter. Represented by N. M. Trapnell and C. B. Denton. Space 315.

Wheel Truing Brake Shoe Company, Detroit, Mich.—Abrasive brake shoes used in correcting deformities of car wheels and locomotive driving wheels. Represented by J. M. Griffin and Mrs. J. M. Griffin. Space 523.

White Company, The, Cleveland, O.—White six-cylinder bus, model 54, with 240-in. wheelbase, seating 33 passengers, equipped with new type body constructed with overhead baggage compartments on the inside; White small bus, model 53, parlor car body, seating 17 passengers; new White heavy-duty truck chassis, model 58; White heavy-duty tractor for use with trailer; chassis units of White six-cylinder bus, model 54, comprising engine, clutch, transmission and front and rear axles; cut-away of White heavy-duty double reduction rear axle. Represented by Saunders Jones, L. G. Avery, W. A. Maynard, G. R. Bryan, H. P. Starbird and V. W. Fries. Spaces 850 to 857, inclusive.

Whiting Corporation, Harvey, Ill.—Standard Whiting electric drop pit table, complete with motor for operation; portable car jack; photographs. Represented by T. S. Hammond, A. H. McDougall, M. J. Evans, J. Ross Bates, F. P. Walsh, H. K. Christie, D. Polderman and O. L. Coffey. Space 757.

Wicaco Screw & Machine Works, Inc., Philadelphia, Pa.—Wicaco continuous oil groover. Represented by William F. Hennesy. Space 825.

Willard Storage Battery Company, Cleveland, O.—Storage batteries for motor coach starting and lighting, for railway train lighting, rail car lighting and starting, stationary service, railway signals, railway telegraph and telephone, operating oil switches and circuit breakers. Represented by S. C. Aikenhead, M. L. Miller and L. Sears. Spaces 378 and 380.

Williams Tool Corporation, Erie, Pa.—2-in. Rapiduction pipe and nipple threading machine; 4-in. rapid rotary pipe and nipple threading machine; 2-in. double spindle bolt threading machine. Represented by E. P. Poole. Space 714.

Willson Goggles, Inc., Reading, Pa.—Space 774.

Wilson-Imperial Company, Newark, N. J.—Car cleaning and renovating compounds. Represented by Frank Sherritt, D. J. Giles and C. A. Beaumont. Space 200.

Wine Railway Appliance Company, The, Toledo, O.—Wine safety-first ladder; Wine Bull-dog side bearings; Wine drop door locks; 70-ton hopper car, WRAX No. 100; C. M. & St. P. gondola 305, 527 with Wine drop door locks. Represented by W. E. Wine, C. J. Holland, Earl H. Fisher, W. F. Cremean, Cyrus Hankins and George B. Christian. Space 611 and on track.

Wood Iron & Steel Company, Alan, Philadelphia, Pa.—"AW" Diamond and "AW" Diamondette pattern rolled steel floor plates; "AW" traffic treads for wooden bridge floors; finished articles for railway uses manufactured from plates or sheets furnished by this company; photographs. Represented by I. M. Smith, J. R. Jones and G. C. Fogwell. Space 9.

Wood Conversion Company, Cloquet, Minn.—Balsam wool passenger car insulation; Balsam wool refrigerator car insulation; Nu-wood insulating board; vibrating machine upon which insulating materials are mounted, reproducing motion of moving car. Represented by E. W. Davis, D. H. Corlette, A. H. Purdom, W. A. Wadsworth, F. C. Vandervort, Jr., and A. L. Van Horn. Space 226.

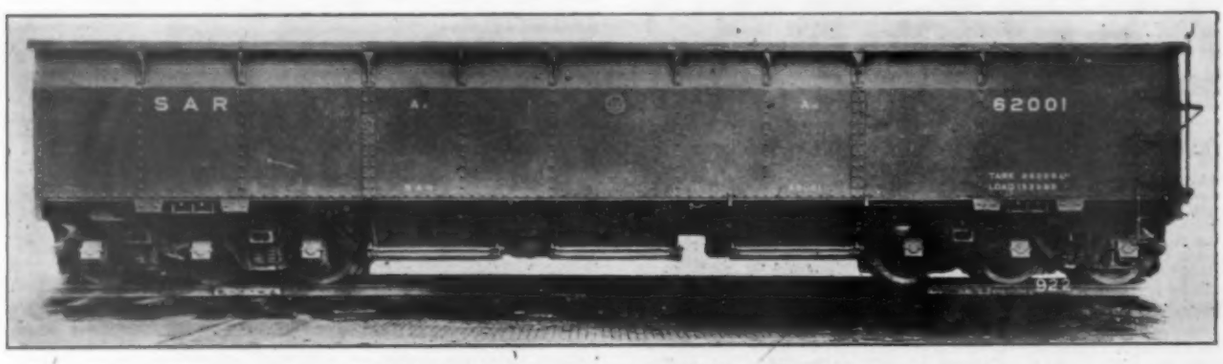
Woods & Company, Edwin S., Chicago.—Anti-friction side bearings; anti-friction center plates. Represented by W. B. Ross. Spaces 554 and 555.

Worthington Pump & Machinery Corporation, New York.—Locomotive feedwater heaters and pumps. Represented by J. E. Buckingham, J. M. Lammedee, F. F. Murray, J. F. Cosgrove, T. C. McBride and D. R. Coleman. Spaces 71, 73 and 75.

Yale & Towne Manufacturing Company, The, Stamford, Conn.—Chain blocks; electric chain hoists; overhead cranes; electric industrial trucks, tractors and trailers. Represented by H. J. Fuller, H. Grimshaw, C. Schroeder, R. B. Kite and C. O. Hedner. Spaces 104 and 106.

Youngstown Steel Door Company, The, Cleveland, O.—Corrugated steel doors. Represented by J. P. McWilliams, A. J. Singer, E. E. Robbins, H. H. Henricks and C. H. Williamson. Spaces 530, 532 and 534.

* * *



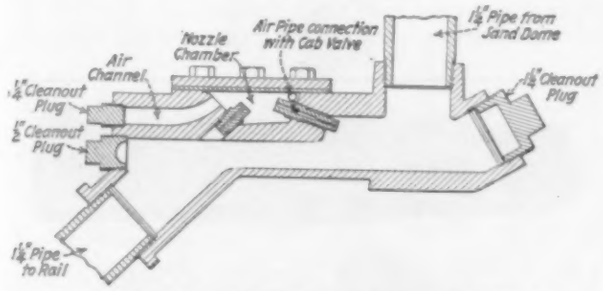
A 76-Ton Gondola on the South African Railways

New Devices

The Hanlon Locomotive Sander

THE Hanlon Locomotive Sander Company, Winchester, Mass., is exhibiting a sand trap designed to provide accessibility to the sand passage and to the air nozzles. By removing the cleanout plugs located at either end of the trap, complete access is obtained to the sand passage.

The two air nozzles are placed in the nozzle chamber



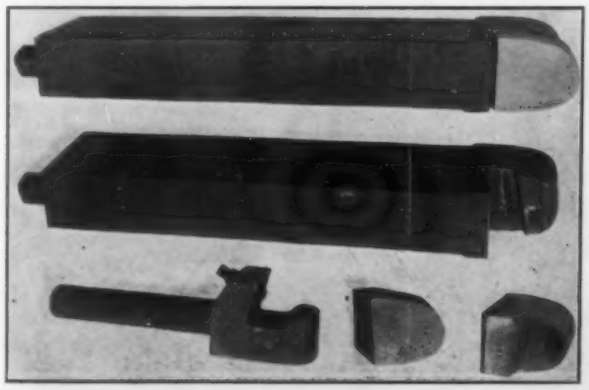
Vertical Section of the Hanlon Locomotive Sander

with one acting as an agitator and the other giving a direct blast of air through the discharge pipe. By this method, the sand is not directed against the inside walls, which prolongs the life of the sander.

Another feature is that the size of the hole in the nozzles can be varied so that any amount of sand can be delivered through any length of pipe.

Shankless Tool Bits and Holders for Heavy Turning

SHANKLESS tool bits and tool holders for locomotive tire and other heavy turning operations are being exhibited by the O. K. Tool Company, Shelton Conn. The tool bits are retained in the holder by



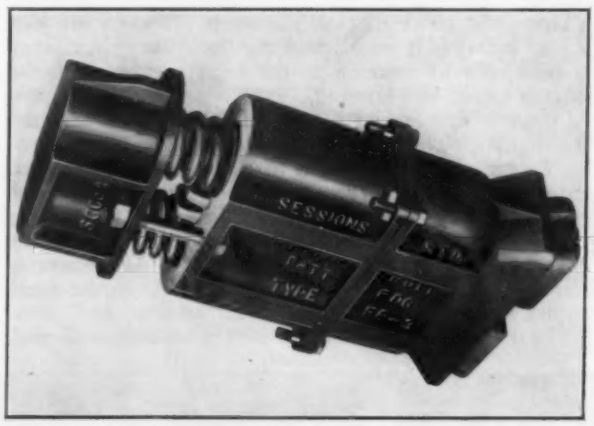
The Tools Are Made in Right- and Left-Hand Types—The Small Holder in the Foreground Is for Use in Grinding the Tool Bits

a double-tapered groove, as shown in the illustration, and are self-locking in the direction of the feed, although the usual rear locking arrangement is used in the holder. The tool may be adjusted sidewise for wear in the direction of the feed merely by moving the block forward, which makes the bit project farther out of the side of the holder.

In having no shank, manufacture of the tool bit is simplified and the cost is reduced. Another advantage emphasized is that in having no hole through it, the tool holder is stronger. The tool bits may be removed, reground and replaced conveniently, a hand grinding holder, shown in the foreground of the illustration, being available to facilitate grinding of the bits. The tool bits are of drop forged high-speed steel, carefully heat treated. The holder is of forged chrome-nickel steel, heat treated. The tools are available in a number of sizes, and in right- and left-hand types.

A Friction Buffer for Passenger Cars

THE Standard Coupler Company, 420 Lexington avenue, New York, is exhibiting a friction buffer for passenger cars, the friction shoes of which are made of a special grade of gray iron and work against steel on all sides. The iron shoes, to which the friction



The Sessions-Standard Type FB-3 Friction Buffer for Passenger Cars

wear is largely confined, are readily replaceable. Of the total travel of 5½ in., 3½ in. is simple spring action which serves to keep the buffer face plates properly extended to meet the conditions of service. The spring capacity, while ample to accomplish this, is low enough to offer minimum resistance to the coupling of cars and does not appreciably affect the action of the draft gear.

The remaining 2 in. of travel is all friction with high initial compression designed to keep the cars evenly spaced and thereby eliminate the shocks incident to the successive bunching and stretching of the train.

The ultimate closing capacity under a 9,000-lb. drop hammer is 17 in. total fall. The static capacity is approximately 250,000 lb. The over-all dimensions are 12½ in. by 7 in. by 27 in. to fit and fill out the regulation pocket usually provided for a buffing unit.

A Crane for Car Work

AN electric crane designed particularly for the use of the car departments has been brought out by the Baker-Raulang Company, Cleveland, Ohio. This crane, which is a specialized adaptation of the Baker locomotive crane, is shown in the illustration at the bottom of the page.

Its particular features are a quick-change block enabling the crane to be used with single line reeving at double its normal speed when light loads are to be handled; reduced wheelbase and over-all width for more flexibility of operation and for operating through congested spaces, and a detachable magnet which may be used for handling scrap, bars, rods, axles, bolsters or any other metal parts.

The capacity of the crane is 3,000 lbs. at a 7-ft. radius with standard two-line reeving for the hook. With single-line reeving the capacity becomes 1,500 lbs. at a 14-ft. radius. All motions of the crane are electrically driven, with the controls all mounted on the dash immediately in front of the operator. Separate motors are provided for travel, slew and for the hoist, a selector switch throwing the hoist power either to the boom or hook cable. A slew of 270 deg. is obtained, the crane having full capacity without outriggers with the boom in the side position. Automatic limit switches are provided for slewing, for upward and downward motion of the boom as well as for the upward motion of the hook.

The hook cable is reeved around a sheave placed on the boom hinge pin and from there leads to the head sheave.

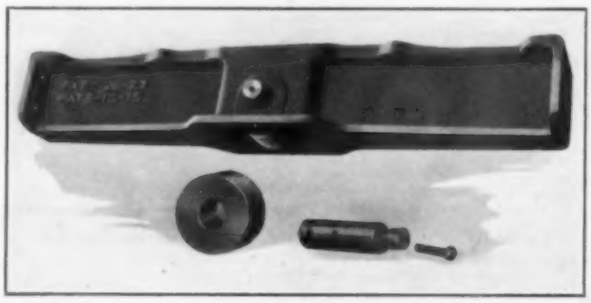
This is a point that will interest all users of this type of crane as it means that the hook does not change its position with relation to the head sheave when the boom is raised and lowered.

Power is supplied by a model DA Ready-Power gas-electric unit. This unit consists of a four-cylinder gasoline engine, direct connected to a generator. The generator armature is large in diameter and replaces the usual engine fly wheel. This engnie, after once being started, requires no attention on the part of the crane operator, as it runs against a governor. This generator supplies power through the various controls to the crane motors.

The magnet is a 20-in. Ohio with push-button control, the buttons being mounted on the dash. This magnet takes its power from the generator on the Ready-Power unit. The slack cable is taken up by means of an Appleton Reelite.

Passenger-Car Body Side-Bearing Arch

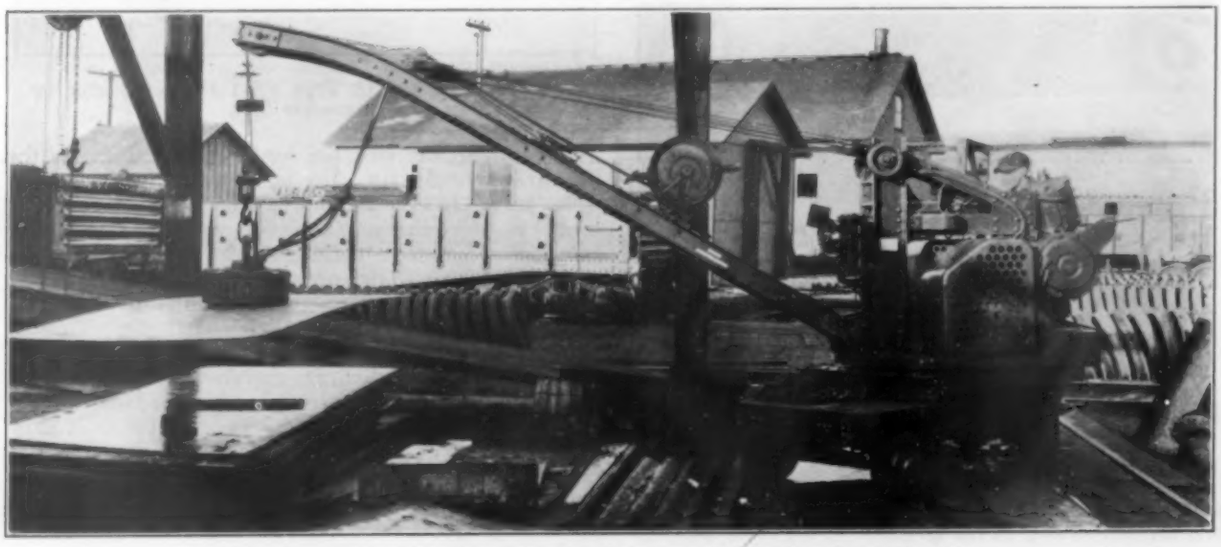
INCLUDED in the exhibit of the Standard Car Truck Company, McCormick building, Chicago, is a car-body side-bearing arch for use on passenger cars equipped with double body bolsters. In the new designs of cast-steel truck frames where side bearings are carried inside the wheels, very little space has been left



Side-Bearing Arch for Use on Passenger Cars with Double Body Bolsters

for roller side bearings. It will be noted that the bearing is secured in the arch and, therefore, occupies practically no additional space. The roller bearing parts are of ample size to furnish the required capacity for heavy cars.

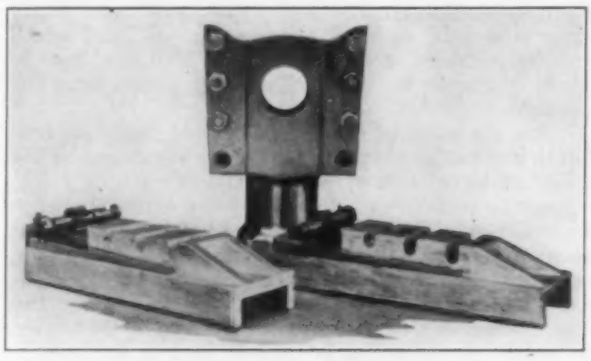
The roller of 5½ in. diameter and 3 in. face is of high-carbon forged steel, machine finished and heat treated. The 2-in. diameter bearing pin is of case-hardened steel. Before hardening, this pin is drilled and tapped for a grease pressure cup and is also drilled for the locking pin which secures it to the arch so that no wear can occur in the arch casting. The arrangement allows the car to be operated should there be a failure of any of the roller parts.



The Power for This Crane Is Supplied by a Gas-Engine-Generator Unit

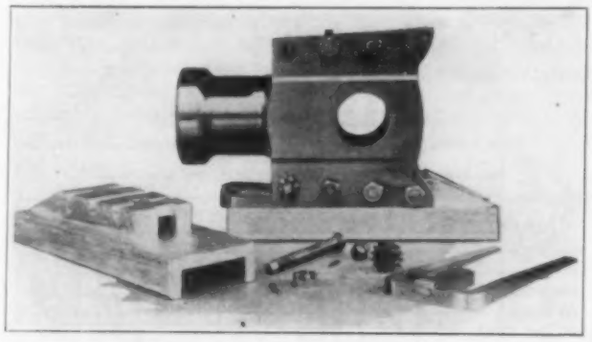
Changes in Rogatchoff Adjustable Crosshead

THE Rogatchoff Company, 1512 Latrobe Terrace, Baltimore, Md., is exhibiting an adjustable crosshead which has been redesigned to facilitate repairs and to permit quicker adjustments. The adjusting screw in the earlier design has been replaced by a rack and pinion



The Rogatchoff Adjustable Crosshead Showing the Pinion Gear and Bolt in Position on the Gear Rack

The pinion gear is keyed or welded onto a bolt with a taper head on one end and the opposite end squared. This pinion gear operates in the rack cut on the adjusting wedge. This arrangement permits the adjustments to be



The Adjusting Wedge and Pinion Gear Are Easily Assembled

made from the side of the crosshead and eliminates the necessity of moving the locomotive to make the adjusting screw accessible. The object of the taper head on the pinion gear bolt is to lock the adjusting wedge in any position. A spacer is placed on the bolt between the pinion gear and the taper head the purpose of which is to prevent the bolt from backing out should the nut end of the bolt break off.

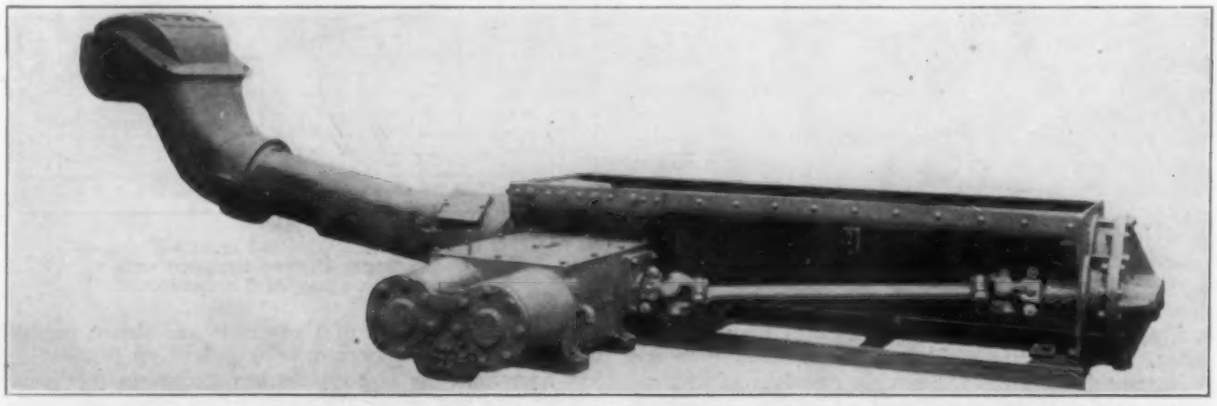
In the older design it was necessary to remove four bolts to take out the adjusting wedge. In the new design it is only necessary to remove the pinion gear bolt to accomplish the same end. The adjusting wedge is now inserted from the front of the crosshead instead of at the rear. The wedge can be adjusted with the main rod in any position. It is not necessary to remove the crosshead shoe to take out the adjusting wedge as it was with the screw adjustment. The old design of crosshead can be readily changed over to the new design. The adjustment is made by placing a wrench over the squared end of the pinion gear bolt.

Stoker for Installation on Hand-Fired Locomotives

TO meet a demand for mechanical stokers for application to existing hand-fired locomotives, the capacity of which could be materially increased but of a construction that would not permit the ready application of the types of stokers in general use, The Locomotive Stoker Company, Pittsburgh, Pa., late in 1927 brought out a type of stoker termed the K-2 which has since been redesigned and designated by the Standard Stoker Company, Inc., 350 Madison avenue, New York, as the B-K stoker. This stoker is included in the exhibit of the Standard Stoker Company.

The B-K stoker follows along the same general lines as the Type B from the rear of the conveyor trough to the point where the forward conveyor joins the rising member termed the discharge box, the same driving engine, trough construction and fastening, conveyor screw, crusher, etc., being used as in the Type B, which is also on exhibition for comparison.

The forward conveyor conduit of the Type B stoker passes underneath the mud ring, where it is connected to a rising member termed the elbow, and discharges the fuel over a firing table located on the inside of the firebox, just in front of and below the fire-box door. In the B-K stoker, the conveyor conduit takes a gradual upward slope from the point where it is connected to the tender trough, and passes up through the deck of the locomotive at a point about 20 in. back of the fire door to a height coinciding with the lower level of the fire-door opening. The door opening is cut down the same as the

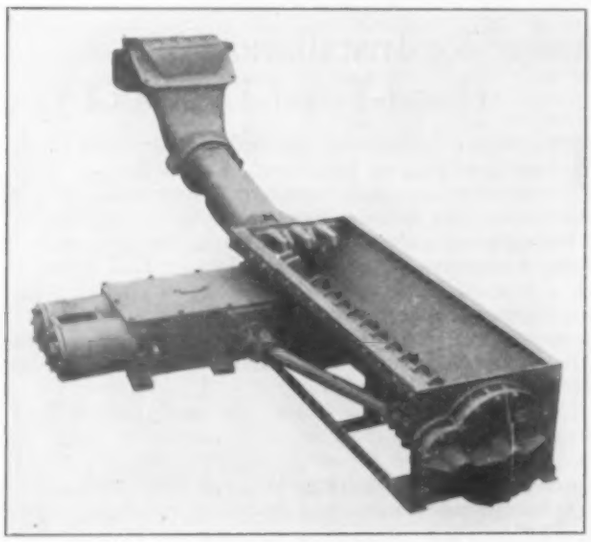


The Standard B-K Type Stoker Designed for Installation on Existing Hand-Fired Locomotives

fire-door opening used in connection with an Elvin stoker so as to permit the introduction of what is termed the distributor plate.

The coal is brought forward in the usual manner by the tender conveyor screw, the lumps being forced against the crusher prongs, and from this point is carried forward and upward with another helicoid screw which is flexibly connected to the tender screw at what is termed the tender bowl. The forward conveyor screw terminates at the bend of the discharge box, and from there coal is elevated in the same manner as in the Type B stoker.

The upper end of the discharge box is flared out sideways and contracted fore and aft. It is flared so that the coal may come up loose. A steam distributor, consisting of two jets, is located in the distributor plate just ahead of the rising mass of coal, so that when the coal is



The B-K Stoker Will Deliver from 1,000 to 25,000 Lb. of Coal per Hour

brought up to that point, it falls over in front of the distributor, where it is caught up by the steam jets and distributed evenly over the entire grate surface. Grooves are provided at the rear of the distributor plate which deflect the required amount of coal into the back corners.

Perforations are provided in the upper part of the discharge box, normally covered with a sliding plate, through which the operation of the distributing system can be observed or through which top or supplementary air can be admitted, if needed.

The general arrangement of the discharge box and distributing plate is such as to offer no interference to hand firing, or to ready ingress or egress through the fire-box door opening.

The B-K stoker has the same construction and uses the same drive engine as the Type B, flexibility between the locomotive and tender being provided, in the same manner, by ball joints in the conveyor conduit and a universal joint in the conveyor screw. The intermediate conveyor is of telescoping sections, having 27 in. of penetration, so that when necessary to make the quarterly drawbar inspection, the locomotive tender can be moved back far enough to permit the removal of the drawbars without separating the stoker, or the locomotive tender can be entirely removed without the necessity of disconnecting any part of the stoker or stoker conveying mechanism.

In the illustrations, the stoker drive engine is shown as located on the left front corner of the tender. This location is optional, however, in that the drive engine can be located either on the locomotive or tender, as deemed preferable, according to the construction of the locomotive.

This stoker has a range of from 1,000 to 25,000 lb. of coal per hour, and is therefore, capable of meeting any demand regardless of the size of the locomotive to which applied, and owing to the fact that there are no hanging bearings, paddles, etc. in the conveying system, ordinary tramp iron such as is often found in coal, and which frequently causes stoker and engine failures, can be passed through the stoker without interrupting its operation.

It has the advantage of simplicity, of ready application to any existing type of locomotive regardless of the design of locomotive or fire-box, takes up little room, and can be so arranged, by placing the drive engine on the tender, as to impose a weight of but 1,213 lb. on the locomotive. The stoker complete weighs 5,334 lb. This, with the stoker drive engine located on the locomotive, is distributed about equally between the locomotive and tender, while with the stoker engine located on the tender, the weight on the tender is 4,121 lb. and on the locomotive, 1,213 lb.

Firing-up Tests of Locomotives Equipped with Syphons

RECENTLY a comparative test was made on two Mountain type locomotives, one of which was equipped with Thermic syphons, manufactured and exhibited by the Locomotive Firebox Company, 310 South Michigan avenue, Chicago, and the other without

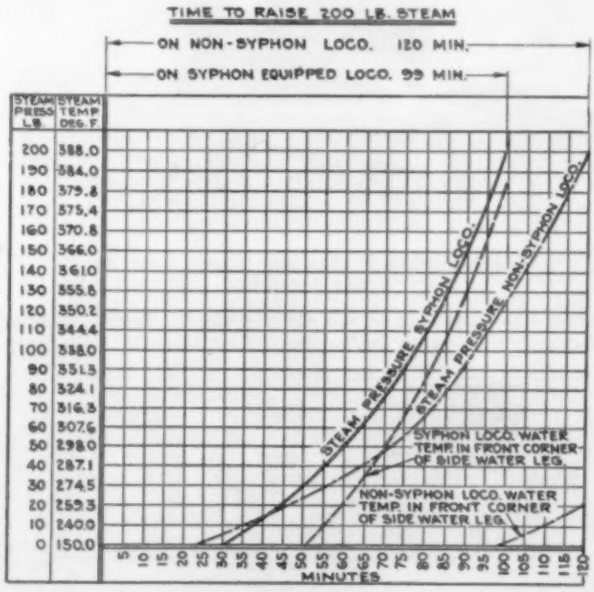


Chart Showing Data Obtained from a Firing-up Test Comparing a Syphon-equipped with a Non-syphon-equipped Locomotive

syphons. The results of these tests are shown in the chart. The syphon locomotive was fired up in 21 min. less time than the non-syphon locomotive, in the same blower line and under the same firing conditions, with 10 per cent less fuel required. Of special interest is the

rapid rise in the temperature of the water in the water leg of the firebox, where a pyrometer was placed to record the temperature. On the syphon locomotive, the temperature rapidly increased with the firing-up of the engine, and, at the time 200-lb. pressure was reached, the temperature of the water in the water leg was approximately the same as the steam temperature at that pressure, whereas in the non-syphon boiler this temperature did not at any time rise over 260 deg. F., indicating comparatively much less circulation.

Hulson Locomotive Tuyere-Type Grate Surface

THE Hulson Grate Company, 21 South Ninth Street, Keokuk, Iowa, is exhibiting a tuyere-type of grate especially designed for use on locomotives that burn smaller sizes of coal or Texas lignite. This type of grate prevents the sifting of the fuel bed and provides ample air opening to support combustion at high rates of firing.

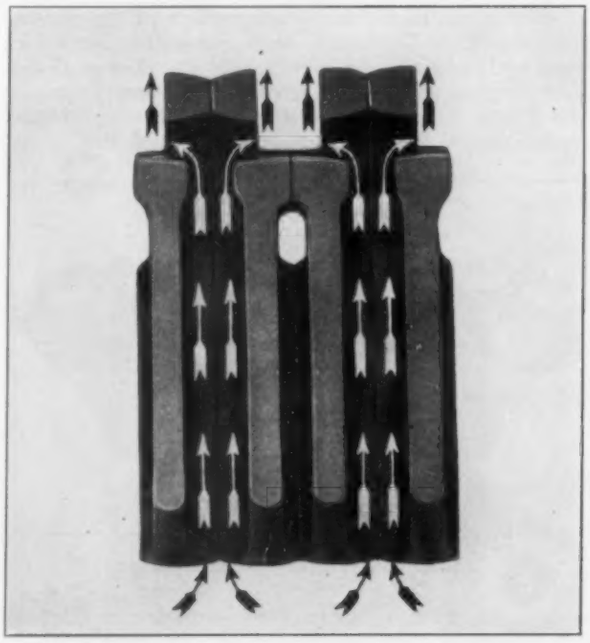
The only radical change in general design from the standard Hulson grate is in the fingers. Referring to the illustrations, the inside or center faces of two finger castings are shown. The castings are identical, rights and lefts not being required, and, when placed together, a chamber is made between them. The air enters from the under side, flows through the chamber to the side openings at the top and thence out onto the grate.

The pattern draft in the side openings is toward the center chamber so that any particle of ash starting through the opening falls through the center chamber, the cross section of which is twice the width of a side opening. These wedge-shaped openings and the chamber, therefore, cannot clog. Forty-two per cent represents the maximum air opening consistent with good practice from a standpoint of molding and pouring in the foundry.

The opening in the valleys formed between the two fingers has a cross-section area greater than the area of the side openings. The result is a horizontal blast action. Opposite streams of incoming air strike each other, resulting in a loss of velocity without a reduction in volume.

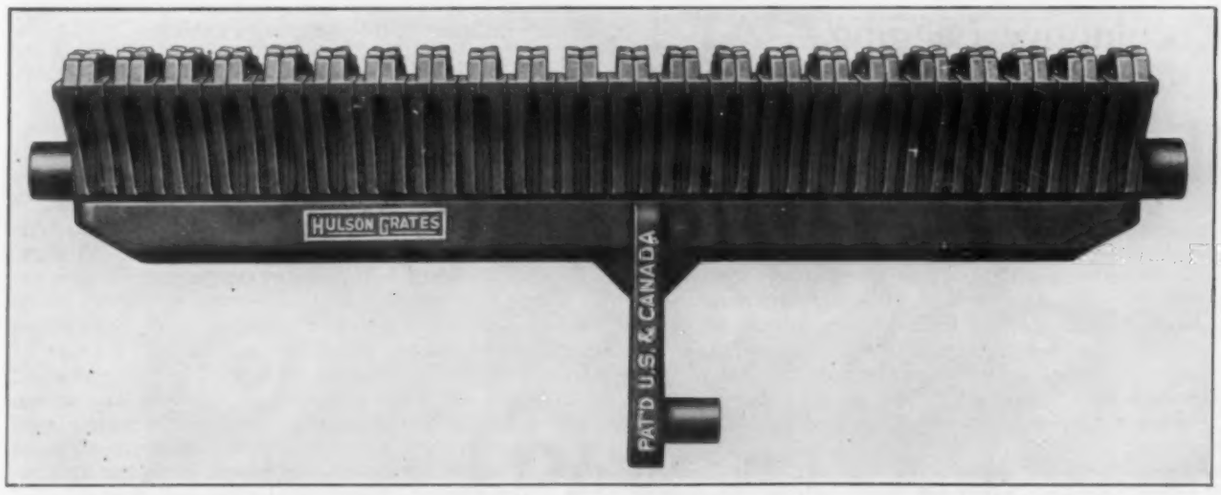
This explains the non-tearing effect of the pulsating draft with these grates. It is said to be impossible to lift the fire from this type of grate surface, yet the supply of air is sufficient for very high combustion rates owing to the fact that very thin fires are possible. No ash accumulation is depended on to support the fuel bed.

The only vertical or direct opening is presented between the ends of the fingers on adjacent bars. This opening is small, the limits of the design and assembly being ⅛ in. to ¼ in. The V-shaped contour of the grate surface at this point permits a practically instant bridging of the small opening and, as the area through it is small in relation to the total air opening, a deposit of ash or fuel at this point is not disturbed except when the grate is moved.



Four Fingers Placed Together and Cross-sectioned To Show the Travel of the Air

The first advantage from this non-sifting grate surface is the practical elimination of ash-pan loss in firing up. For example, it is claimed that less than eight pounds of coal is lost in the pan from a grate surface of 80 sq. ft., using screenings. The second advantage is the elimi-

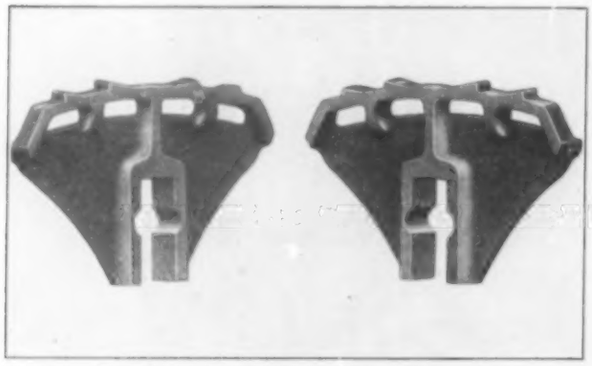


Assembled Finger Bar and Fingers

nating of the sifting through of ash and coke on the road, which tends rapidly to fill up the pan.

As no ash can sift through between the fingers, it must work off the ends of the fingers. In order to accomplish this under thin fires, the tops of the fingers are provided with "pushers" or "scratchers" which disturb the ash and push it forward or back to the openings between finger bars when the grates are moved. The same rolling action of the grate is maintained as with the standard straight-draft Hulson grate.

Observations of the non-tearing effect of the tuyere-type grate have been made with rice anthracite, buckwheat anthracite, lignite, Kentucky coals, dock coal and West Virginia and Illinois screenings. Observations on 2-10-2 type locomotives, stoker fired, burning "Island Creek," logan, W. Va., screenings, showed that, prior



Inside Faces of the Finger Castings

to the application of the tuyere-type grate, the combustion chambers accumulated fly ash and combustible in sufficient quantities to require removal each trip. With the tuyere-type grate, no appreciable quantity was found at the end of a 30-day period.

The tuyere-type fingers are interchangeable with the different sizes of straight-draft Hulson grate fingers, the finger-bar construction remaining the same. The total weight of the grate is the same as the standard straight-draft grate, varying from 63 lb. to 75 lb. per sq. ft., depending upon the ratio of the length and the width of the firebox and the design of side and center frames, dump grates and dead grates.

Locomotive Lagging Made from Rock

THE Tuco Products Company, 30 Church street, New York, is exhibiting an insulation for locomotive boilers, designated as Ralo Rockwul. It is composed of argillaceous limestone reduced to a molten state and shredded by a steam jet into fine silicate fibres. It is, therefore, actually a wool made from rock, which is said to form an excellent insulator for hot surfaces which, owing to its mineral character, is highly durable.

Tests conducted by the United States Bureau of Standards give Rockwul a thermal conductivity of only .26 B.t.u. per inch of thickness, per square foot, per degree difference of temperature, in one hour. Rockwul is also completely fireproof and is not affected by vibration or moisture.

When used for locomotive lagging, it is held or "Quilted" between expanded metal lath on the outside and poultry netting on the side next to the boiler shell. It is furnished in sheets or blocks of any desired thickness for application to the boiler shell or cylinders. When used for insulating the flexible staybolt sections and projections from the boiler shell, it is furnished in the form of a cement. This cement can be readily applied by hand or trowel.

Hunt-Spiller Rod Bushings

WITH the advent of the floating side rod bushing, the Hunt-Spiller Manufacturing Corporation, 383 Dorchester avenue, Boston, Mass., has cast from air furnace gun iron the outer bushing in which the brass bushing floats. This outer bushing is pressed tightly in the rod with the flange on the outside face of

An Assembled View of the Brass Floating Bushing and the Hunt-Spiller Outer Bushing

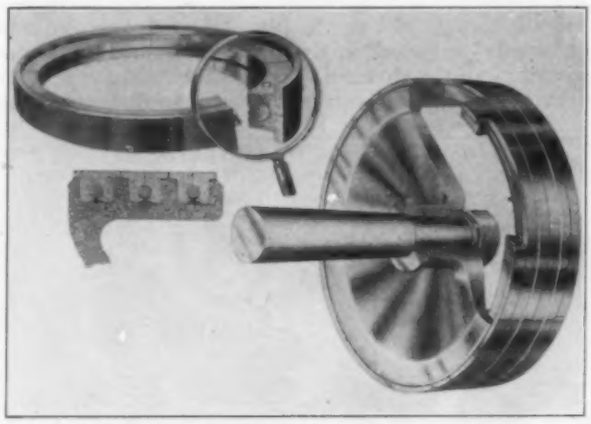
the rod. It must be made of material best adapted to withstand the wear of the inner bushing, and the thrust and pounding to which it is subjected. It is claimed that the Hunt-Spiller iron bushing increases the service from rod bushing and ultimately, when the inner floating bushings must be renewed, makes it possible to apply new floating bushings without taking down the rods.

Typical installations of both the inner and outer bushings are included in this company's exhibit.

Universal Sectional Bull-Ring Packing

THE Locomotive Finished Material Company, Atchison, Kan., has included in its exhibit a combination sectional bull ring and packing which consists of a light steel piston with three sectional T-rings which bottom in the groove and carry the weight of the piston as well as providing the packing function. This type of piston replaces the usual spider, riveted bull ring attached thereto and the usual packing rings. With this design the weight of the piston is reduced approximately one-half. The principal advantage is that these rings can be renewed without removing the piston from the locomotive. The present conventional rigid bull ring or solid piston wears at the bottom, while it is claimed that the

sectional bull ring is free to rotate on the piston and actually wear evenly around the circumference. On oversized rings this permits of double service; for example, a 25 3/8-in. ring may be worn 1/4 in. in diameter and then applied without any alteration labor to a 25 1/8-in. cylinder.



Combination Sectional Bull Ring and Packing

Franklin Type G Precision Power Reverse Gear

INCLUDED in the exhibit of the Franklin Railway Supply Company, New York, is a Type G Precision power reverse gear, designed for use on the more modern locomotives. The gear retains all the features of the Type F gear with some added advantages.

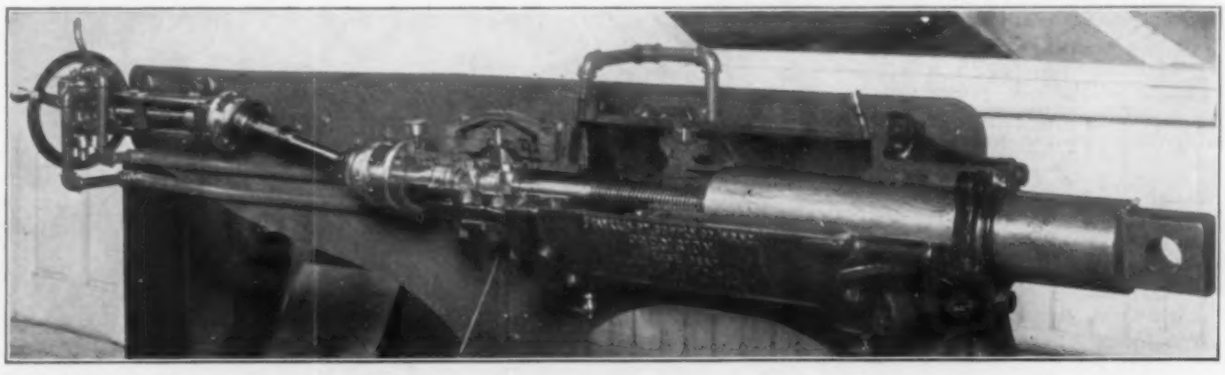
The steam connections are not necessary since it is possible for the engineman to operate the locomotive in case of lack of air without fluid pressure within the gear cylinder. With the addition of a micrometer adjustment, any desired cut-off can be obtained and, because of a locking feature, positively maintained. The desired cut-off can also be held more closely because of the one-to-one ratio between the gear valve and the gear piston. Pins and levers have been eliminated and, hence, lost motion has been reduced to a minimum. With the addition of a cab indicator, the engineman is furnished with an accurate indication of the point of cut-off. The gear may be locked so that not only the handwheel is mechanically prevented from turning but the piston is held by air pressure against a solid stop.

A Full 2-in. Locomotive Pressure Reducing Valve

THE Vapor Car Heating Company, Railway Exchange building, Chicago, is exhibiting a full 2-in. locomotive pressure-reducing valve, designed to deliver any volume and pressure of steam for heating long passenger trains. It can be easily set for the delivery of any pressures up to full boiler pressure, and will maintain uniform pressures without fluctuation or chattering.

The No. 238 Locomotive Pressure-reducing Valve

The valve is made on the same principle as the No. 235, 1½-in. by 2-in. valve, except that the No. 238 valve is designed with graduated main and auxiliary valves to equalize low pressures and volumes and thus avoid wire



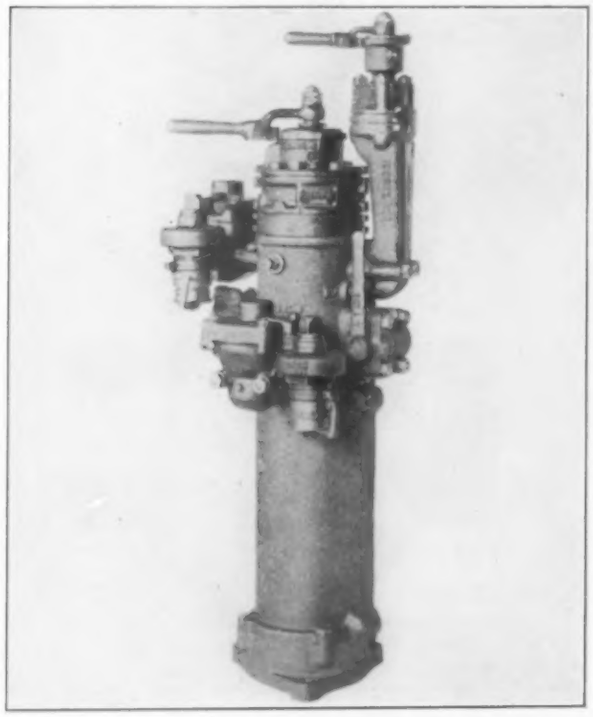
A Cut-away Model of the Franklin Type G Precision Reverse Gear

drawing. The wearing parts of the valve are easily and quickly renewed without removing the valve from the boiler connections.

Brake Valve Pedestal

THE Westinghouse Air Brake Company, Wilmerding, Pa., is exhibiting several types of brake valve pedestals which were developed to simplify the arrangement of apparatus and piping in the locomotive cab, to improve appearance, and to reduce maintenance costs.

All pipes are connected to a floor bracket, while the several operating devices are attached to the body of the

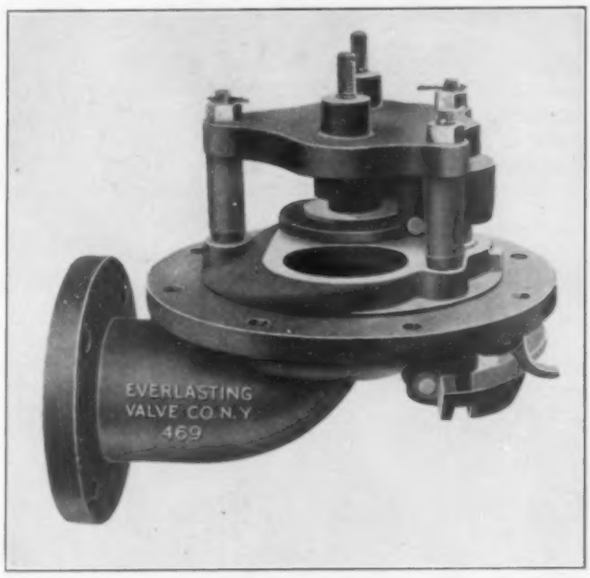


Brake Valve Pedestal with the Piping All Connected to a Floor Bracket

pedestal. Reduction in the number of joints decreases the possibility of pipe breakage and air leakage. The arrangement of operating devices makes them readily accessible for inspection, adjustment or removal.

Everlasting Tender Tank Valve Redesigned

THE Everlasting Valve Company, One Exchange Place, Jersey City, N. J. is exhibiting a tender tank valve designed so that the functioning parts pass directly into the tender through the bottom of the water frame. The object of this is to obtain a freer flow through

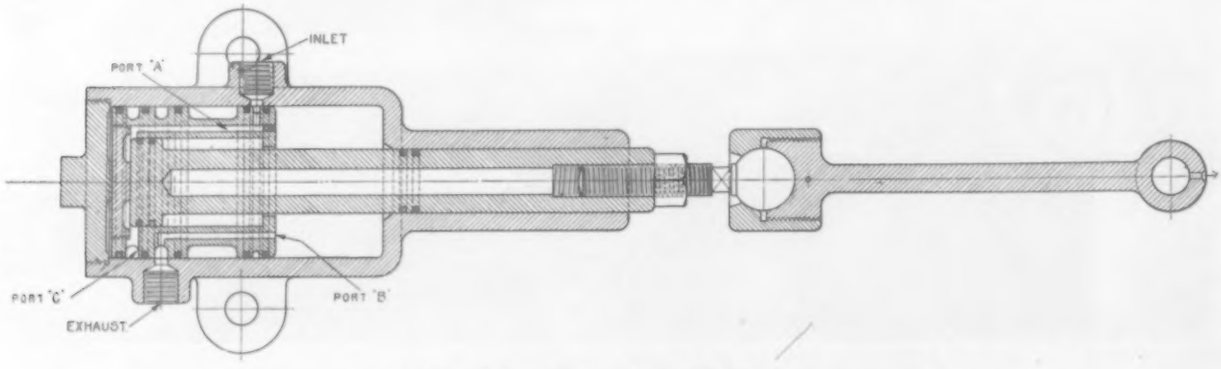


The Everlasting Tender Tank Valve with the Screen Removed

the valve. The valve is so constructed that no parts will shake loose and obstruct the flow of the feed-water. The disc acts as a safety relief valve when shut, with the heater on, thus preventing the possibility of the tank hose bursting. If desired, a control shaft can be arranged to extend upward through the tender with a functioning control above, permitting operation from the deck.

A Bell Ringer which Does Not Turn Over

AN air-operated bell ringer which does not turn over is being exhibited by the Ardco Manufacturing Company, One Newark street, Hoboken, N. J. The air pressure is admitted through port *A* and drives the



The Ardco Air-operated Bell Ringer

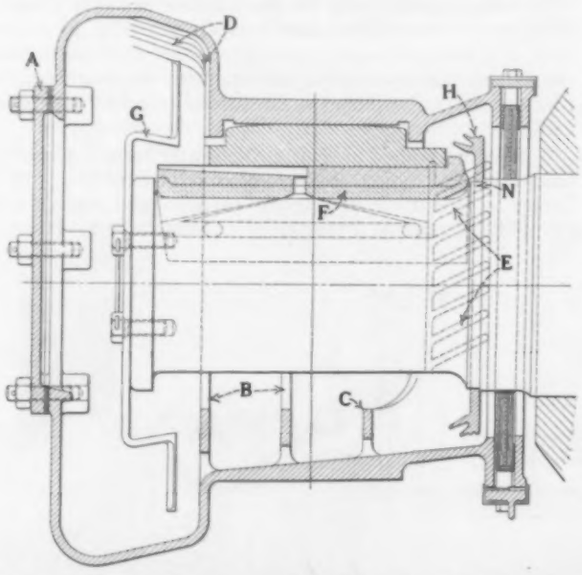
piston upward for the full 2-in. stroke. Any air in the upper chamber is allowed to escape through port *B* to the exhaust.

When the piston has completed its full stroke, the momentum of the bell carries the valve upward closing the port *B* and opening the exhaust port *C*. Any additional movement compresses the air in the upper chamber, bringing the bell to a stop. When the bell has completed its upward motion and is returning to normal position under its own weight, the piston moves downward in the valve until the remaining pressure under the piston is sufficient to overcome the friction between the valve and the wall of the outer cylinder, forcing the valve down until it again opens the port *C*, allowing the remaining pressure beneath the piston to escape. The piston at this time strikes the bottom of the valve, carrying it downward until port *A* is again open and the operation repeated.

Journal Boxes Designed for Automatic Lubrication

THE Isothermos Corporation of America, 11 West Forty-second street, New York, is exhibiting an automatic method of journal lubrication which, although just introduced in this country, is in use on 31 railroads in Europe, Asia, Africa and South America. It has been in service for a year on several locomotives in America.

In the Isothermos journal box everything in the nature of lubricating packing is dispensed with, and in its place are two special appliances, one called the dipper or oil



A Journal Box for Automatic Lubrication Designed to Meet A. R. A. Standards

distributor at the front of the journal, supplying the journal with oil as soon as the car or locomotive moves, and the other called an obturating ring located at the rear of the box, which gathers the oil that flows along the journal past the bearing. The spare oil thus gathered by the hollow ring is thrown by centrifugal force against the sides of the box and then flows by gravity along inclined grooves cast in the box, returning finally to the bottom of the box where it is led into the oil reservoir by the inclination of the bottom of the box.

Lubrication by dripping starts as soon as the locomotive or car is set in motion, the dipper on the end of the journal picking up the oil from the supply in the base. The stream of oil thus taken up comes in contact with the top front of the bearing where it is broken up and falls into the lateral grooves provided in the top of the bearing.

In this operation, the stream of oil is directed by the angle part of the dipper, so that the oil which adheres to the sides of the dipper falls by gravity along the so-called dripping angle. Lubrication by centrifugal force follows lubrication by dripping as soon as the speed of the car increases. The oil is then projected against the interior of the box body from which it is directed along fan-shaped grooves, cast with the box body, and runs back towards the bearing. The oil holes and grooves in the upper part of the bearing, therefore, receive a stream of oil which is directed into the lubricating grooves of the bearing.

This journal box is made of steel or cast iron and forms one solid piece closed in front by a lid *A* which permits of easy examination of the various parts. A circular opening is provided on the side of the box, through which the oil is introduced and which determines the level of the oil. The bottom of the box containing the oil is divided by a vertical wall *B* through the base of which are holes to permit intercommunication.

The reservoirs thus obtained enable the oil to come to rest after it has returned to the bottom of the box. A vertical wall *C* is also provided to avoid heavy splashing of the oil while the train is in motion. It also forces the oil coming from the rear of the box to flow back towards the front reservoir. Oil grooves *D-E*, cast with the box, direct the oil at *D* towards the bearings, and at *E* towards the interior of the box. At the inner end of the box a groove is provided to hold the dust-guard; it is opened only at the top, or at the top and bottom, according to necessity.

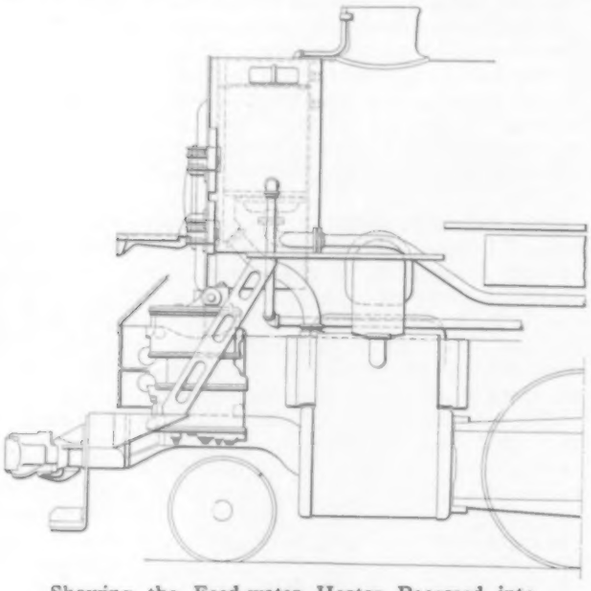
The oil dipper *G* is cast in one piece and shaped to provide a suitable dripping angle which passes over a specially designed bearing *F*. This dipper is fixed on the end of the journal by studs and nuts and revolves with the journal; a steel wire is fixed between the two studs to provide a locking device. The ends of the dipper are filed thin to prevent stirring up the oil more than is necessary. While revolving, the ends of the dipper enter the oil to a sufficient depth to insure that sufficient oil will be picked up for distribution over the journal. At speeds above approximate 15 m.p.h. the lubricant is thrown against the inside walls of the box, which constitutes centrifugal lubrication and drops by gravity on the bearing at speeds up to 15 m.p.h.

The bearing, *F*, is provided with oil grooves, wide and deep, which are constant oil reservoirs fed in the center and on the sides by distributing channels slotted on the outside face of the bearing. These channels are fed by the dripping finger of the oil dipper. The part of the bearing over which the finger of the oil dipper travels has a length designed according to the lateral play allowed between the bearing and journal and bearing and box, and the limits of wear that have to be observed for the bearing and the fillets of the journal.

The hollow malleable iron part *H* is shrunk on the shoulder back of the journal, and revolves with it performing the duties of an oil retainer. Usually a shoulder is also provided at *N* to insure the maximum safety. The dust guard, in two pieces, is made up of leather and felt, held together by two steel castings sliding into one another. The dust guard bears against the axle under the pressure of light springs which take up automatically any play or clearance resulting from wear.

Circulating System in the Coffin Feed-Water Heater

THE J. S. Coffin, Jr., Company, 36 Grand avenue, Englewood, N. J., is exhibiting a feedwater heater showing the water circulation through the system. In the illustration showing the piping arrangement, the feedwater flows into the auxiliary heater compartment *D*, either of the



Showing the Feed-water Heater Recessed into the Smokebox

integral type or built in manifold type, between the auxiliary heater casting and the tender floor. While passing through this space, it is mixed with the condensate and excess steam from the main heater on the front end.

Whether of the integral or manifold type, the auxiliary heater compartment acts as a settling tank and allows the liberated oxygen and lubricating oil to rise to the surface of the water in the vent pipe (1), where the oil remains until the tender is refilled. The oil then floats to the top of the pipe where it overflows into the vent well, secured to the top of the tender, and then to the track through the overflow pipe. The ¾-in. vent at the top is applied to prevent syphoning. The water then flows by gravity to the pump through the suction strainer *E* and is then pumped through the main heater *B* into the boiler of the locomotive.

Just above the pump, the feed line branch is taken off. This supplies the squirt hose and leads to the water end of the control valve *C*, the water connection of the duplex gage *F*, and the ¾-in. vertical ball check *J*. The vertical ball check is merely an inverted check which stands open when the pump is not in operation, insuring that the pump is primed at all times.

The heads of the heater *B* are arranged to cause the feedwater to pass through five groups of tubes, each group or pass having tubes approximately 10 ft. in length, making a total water travel within the heater of about 50 ft.

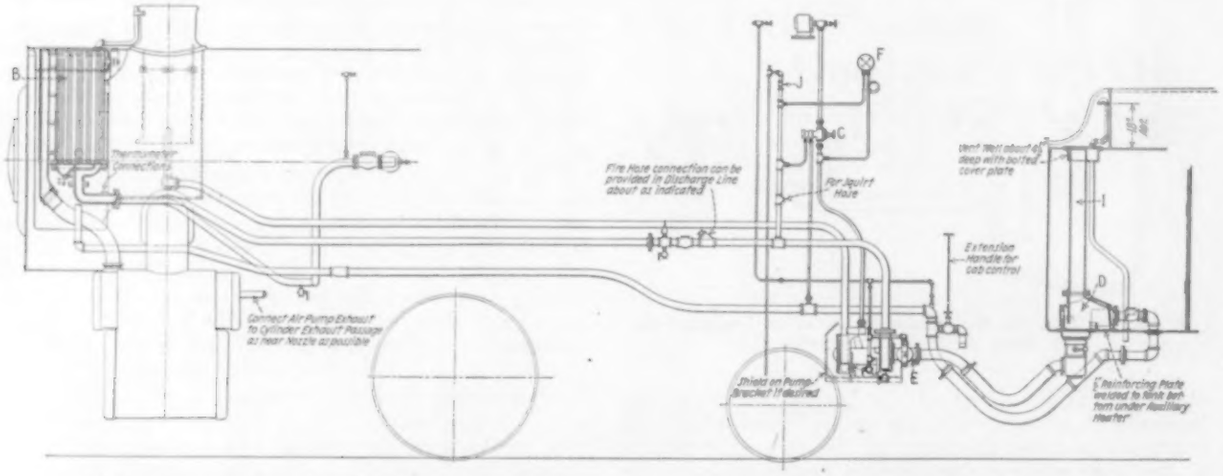
The first pass is farthest from the steam inlet, the second pass is toward the front, etc., and the fifth or final pass is directly adjacent to the baffle. Thus the water heats progressively toward the front and the steam flows toward the rear. The hottest water passes through the tubes surrounded by the hottest steam.

The 1¼-in. open vent pipe extending from the top of the heater up in front of the stack is to insure a positive circulation of exhaust steam toward the rear of the heater and to prevent formation of air pockets in the steam space of the heater—exactly comparable to an air valve on a household radiator.

The condensate flows by gravity down the outside walls of the tubes to the condensate connections on each side of the heater; thence back to the auxiliary heater *D* in the tender, with a certain amount of excess exhaust steam.

The steam conduits to the main heater are now integral with the heater. Since this feature has been incorporated, it is only necessary to apply a short pipe connecting the exhaust cavity of the cylinders with the heater, as the connection on the heater is considerably below the boiler center line.

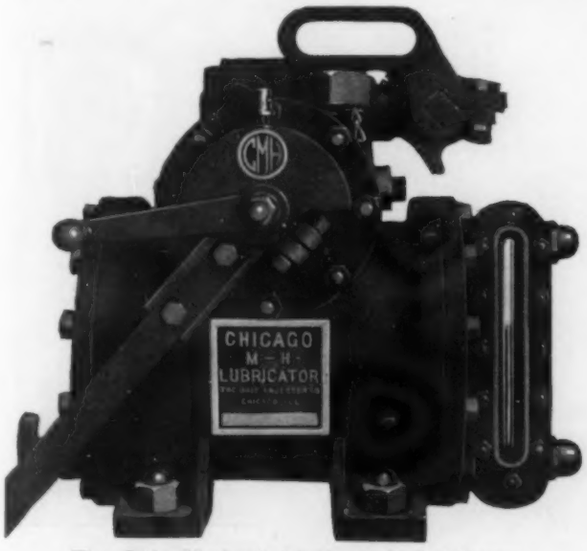
A new method of mounting the heater recessed into the smokebox is shown in one of the illustrations. The heater is now made to suit any capacity and also to conform with the outside diameter of any smokebox. It can be recessed so that no part of the heater extends beyond the smokebox. A unique method of applying the Okadee hinges is also shown.


B
Thermometer Connections
Fire Hose connection can be provided in Discharge Line about as indicated
F
J
C
For Squirt Hose
Vent Pipe about 4½" deep with bolted cover plate
Extension Handle for cab control
D
I
Connect Air Pump Exhaust to Cylinder Exhaust Passage as near Nozzle as possible
Shield on Pump Bracket if desired
E
Reinforcing Plate welded to Tank bottom under Auxiliary Heater

Piping Arrangement of the Coffin Feed-water Heater from which May Be Traced the Flow of Water Through the Feed-water Heating System

Mechanical-hydrostatic Cylinder Lubricator

A MECHANICAL-hydrostatic cylinder lubricator which, as its name implies, uses both the mechanical and hydrostatic principles in its operation, is included in the exhibit of the Ohio Injector Company, 53 West Jackson boulevard, Chicago. The feed valve is



The Ohio Mechanical-hydrostatic Lubricator

driven by a connection to some reciprocating part of the locomotive. The oil displacement and steam delivery are obtained by hydrostatic lubricator principles.

The oil reservoir and mechanical mechanism cylinders are cast in one unit and provide a capacity for 12 pints of oil. The oil reservoir capacity may be increased by adding one or more five-pint sections. It is also designed to add any number of feeds required.

Pipe Unions With Solid Iron or Bronze Seats

THE Corley-DeWolfe Company, 323 Pine Street, Elizabeth, N. J., is exhibiting a line of pipe unions designed to withstand 300 lb. working pressure. The union with a solid iron seat is for high temperatures, superheated steam, hot gases and fluids that would affect a bronze seat. The union with a bronze seat is for use in ordinary steam, water, gas and air lines.

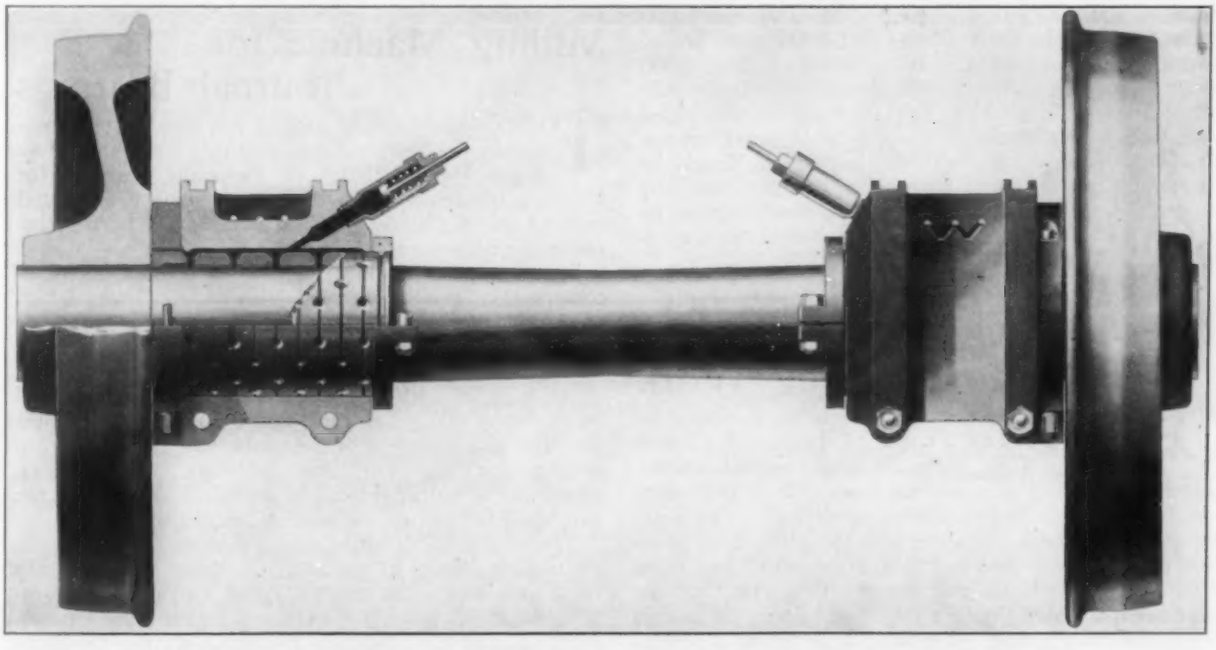
The bronze seat, a heavy cast ring, is pressed and expanded into a dovetail machined recess. This insures a tight seat that will not loosen and is an integral part of the union. The ball end is malleable iron which is machined and ground to a master radius from the center of the circumference of the pipe thread. The collar is undercut permitting a joint for pipes that are slightly out of line. The nut is heavy, strong and carefully machined to close limits. The collar is turned with a filet, adding extra strength where needed. The hole is first bored, then reamed when the nut is tapped, assuring alignment.

The joint between the bronze seat and the malleable iron ball end is designed to be repeatedly used without a gasket. These joints are ground to masters rather than in pairs. All parts are interchangeable.

Floating Journal Bearing and Hub Liner Combined

THE Viloco Railway Equipment Company, 14 East Jackson boulevard, Chicago, is exhibiting a floating journal bearing and hub liner combined, which is adaptable to inside and outside journal bearings for engine trucks, driving wheels, trailer trucks and tank trucks, providing grease lubrication on all applications.

The hub liner, being integral with the journal bearing, affords a means of revolving the combination so that wear is distributed over the circular area without danger of the bearing becoming crown worn. The bearing is

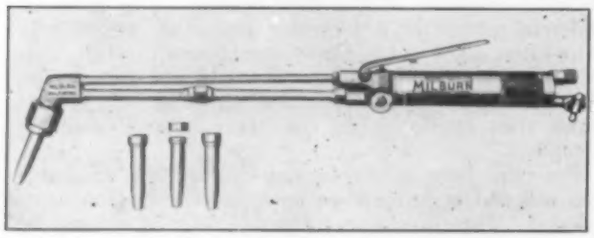


The Viloco Combined Journal Bearing and Hub Liner Applied to a Pair of Wheels

divided in halves with suitable clamps and bolts for securing the halves. Grease lubrication is supplied by a compression cup.

Combination Cutting and Welding Torch

THE Alexander-Milburn Company, 1416-1428 West Baltimore street, Baltimore, Md., is exhibiting the new Milburn combination cutting and welding torch, Type TI, which is designed to speed up welding and cutting operations and save labor and gas. It is not necessary to change the tip to convert the torch from cutting to welding. A convertible feature permits changing it from a cutting to a welding tip, or vice versa, by a quarter turn of the tip. In one position the gases are automatically passed through the preheating gas passages while the high-pressure oxygen is carried through the central hole for cutting. In the next position the cutting oxygen is cut off and the welding gases are conveyed through the central passage of the cutting tip, making a welding flame.



A Quarter Turn of the Tip Converts the Torch from Cutting to Welding, or Vice Versa

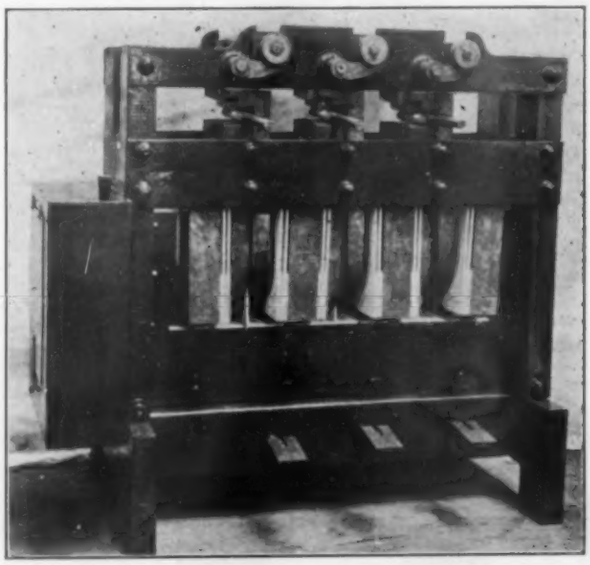
The standardized Milburn combination cutting and welding torches save the expense of one torch and the time formerly lost while changing torches. The new torch, however, not only saves the operator's time, but it also avoids the necessity of purchasing two sets of tips. The Milburn principle of supermixing has been retained in the Type TI.

The torch heads, valves, bases and other parts are of bronze forgings, having a tensile strength of about 5,000 lb. per sq. in. The seamless high-pressure tube is specially drawn with walls of triple thickness and is of nickled silver which has double the strength of brass tubing. Flashback is eliminated even though the tip should be inserted in molten metal. The new tips are especially constructed so that when the tip may have outlived its usefulness as a cutting tip, it is still serviceable as a welding tip.

Two-Path Electric Heater for Forging Work

ONE of the recent developments being exhibited by the American Car & Foundry Company, 30 Church street, New York, is the Berwick two-path electric heater for forging or upsetting work. It is built with one, two, three or five electrodes, as desired. The heating length, as the heaters are now designed, runs from 1 in. to 8 in., or the heater can be arranged to heat from 3 in. to 11 in. If desired, the length of heat can be increased by making only a slight change in the design of the standard heater. The No. 3 type heater is recommended for high production where ⅜-in., ½-in., or ⅝-in. diameter metal is to be used. The No. 4 type heater should be used for heating ⅞-in. to 1⅛-in. stock to get a high hourly production.

The method of operation of this heater is somewhat similar to that of the rivet heater. The lower electrodes, which are attached to the left-hand secondary coil of each set, are stationary, while the upper electrodes and right-hand secondary coil of each set are arranged with vertical adjustment by depression of the foot-treadle, which raises the electrodes sufficiently to insert or to remove the material. With the two paths for the flow of the secondary current, the time of heating is said to be greatly reduced and any marring of the stock is also eliminated.



No. 3 Three-Electrode Berwick Two-Path Heater for Forging Operations

Milling Machine for Journal Bearings

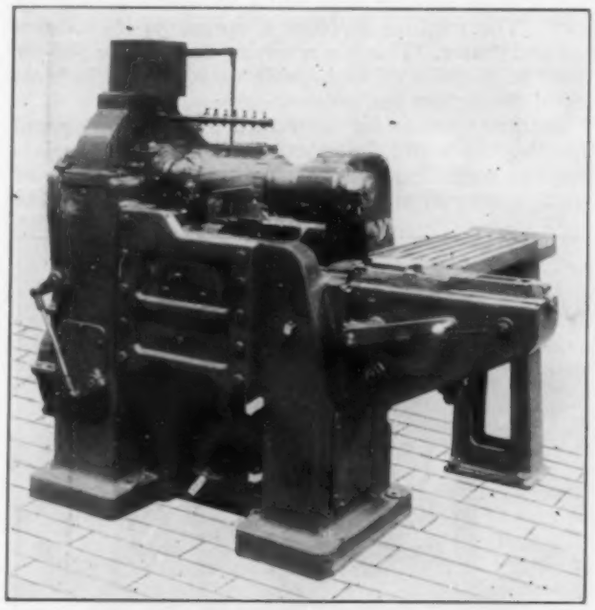
THE journal-bearing milling machine being exhibited by the Morton Manufacturing Company, Muskegon Heights, Mich., is especially designed for finishing, in one operation, the bearing surface, fillets and ends of the A. R. A. standard car journal bearing between the columns and side plates.

The chuck for holding the brasses is of square box construction, and is provided with rotating jaws which open and close automatically as the chuck is raised or lowered to and from the cutter. It is fitted to a running bearing between the columns and side plates. The chuck is raised and lowered by a quill which is threaded on its lower end. The quill is provided with lock nuts for vertical adjustment of the connecting members when setting for different size bearings. Steel jaws, which can be quickly placed in position and removed, are furnished for the various sizes of bearings.

The cam is so designed that the work moves quickly up until it comes in contact with the cutter. It then feeds slowly into the cutter. After finishing its operation, the chuck quickly lowers and on the return movement automatically releases the jaws, leaving the work free to be removed. Power is transmitted through

gears from the arbor to the cam. The eccentric adjustment applied to the trunnion for raising and lowering the chuck provides a means whereby the work may be raised to take a second cut when required. The controlling quadrant has three notches, each giving .026 in. adjustment. When the bearing does not clean out perfectly in the first cut on account of shrinkage, the lever may be adjusted one notch as the chuck returns to its down position, and the second cut may be made without removing the work. This may be operated for third and fourth cuts, where necessary.

The controlling lever is located within easy reach of the operator. Power is applied through gears for driving the cutter and arbor. A specially designed friction clutch and brake are used for instantaneous starting and stopping. The machine stops automatically when the chuck is at its lowest position. The main driving arbor



Front View of the Morton Car Journal-Bearing Miller, Showing the Loading Carriage

is hollow and journalled with adjustable bronze bearings. The cutter arbor is fitted and feather-keyed, permitting adjustment sideways for aligning with the work. The arbor and shafts are made of special spindle steel, rough turned, keyseated where required, and finally ground true.

The outer bearing for the cutter arbor is tongued and fitted in a centering slot, held in position by two bolts. It may be quickly removed by unscrewing the round compression nuts and sleeve bearing. This makes possible easy removal of the cutter. The cutters are made with adjustable special steel blades which may be set out as required after several regrindings. The filleting cutters are secured to the body of the journal sizing cutter and may be adjusted to meet requirements.

The lubrication of the cutter is done automatically by gravity. A supply tank is located on top of the gear case. A valve is operated by levers and a vertical rod which is lifted by the chuck as the work strikes the cutter and is closed as it returns. This gives the right amount of oil to insure perfect cutting. A manifold with needle valves to regulate the drop and distribution for various size cutters, provides a reliable control. All bearings in the main column are lubricated automatically.

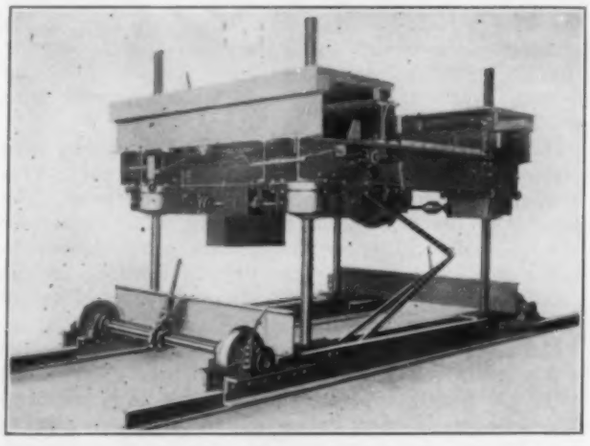
The bearing loading carriage attached to the right-hand column enables the operator to place the work on the outside, eliminating any chance of injury from the cutter. The bearing is placed on a sliding plate. By moving the lever to the left, it is set in operating position and centered with the cutter. After it has passed the cutting cycle, the lever is moved to the right and the bearing is placed for unloading.

The chipping and inspection bench with changeable vee-blocks for various sizes of bearings can be attached to the loading bracket. It is supported by a pedestal at the outer end. The top surface is finished, and the bearings are easily moved thereon to the vee-blocks for chipping. With this method only one lifting or placing of the bearing on the operating carriage is necessary. It then passes through the entire operation and is finished and placed on the truck ready for shipment.

The power for driving may be applied by a directly attached constant-speed electric motor, either a. c. or d. c. The motor is secured to a bracket provided with adjutments for giving tension to the endless belt. The push-button control for stopping and starting is placed within easy reach of the operator. The machine may be driven from an ordinary countershaft if desired.

Wasco Four-Screw Electric Drop-Pit Table

THE Watson-Stillman Company, 75 West street, New York, has added to its line of railroad tools a new four-screw electrically operated drop-pit table, which is being exhibited this year. It is composed of three units: A detachable top, drop-pit table and guides. The table is built of standard materials and shapes securely bolted and riveted together as a unit. The part to which the rails are fastened consists of built-up box girders in each end of which move locking bolts guided by castings. The locking bolts are moved to lock



The Operation of the Table Is Controlled from a Pendant Push-Button Station Carried in the Hand of the Operator

or unlock the table top by levers operative from either side. The shoulders of the top have heavy oak flooring and the pit, about 18 in. deep as a standard, has matched flooring. The top is designed to carry a live or dead load of the maximum axle loading usually encountered in enginehouse practice.

The table consists of a structural steel superstructure

to which the electrical control and motor are fastened. All electrical equipment is protected from any dropping of water from a locomotive. The drive is from the motor through cut spur gears to a shaft extending to both sides of the table. Hardened steel bevel gears, encased and running in a bath of oil, transmit power to each corner of the table. A shaft coupling transmits power to a worm with a ball thrust bearing and a worm wheel backed up with a roller thrust bearing. This in turn, revolves a bronze nut of generous proportions about a steel cut screw. All worms, worm wheels and nuts are encased, running in an oil bath and these as well as the screws, are all right hand. The screws are rigidly held in castings in the truck which prevent turning or lifting. They are proportioned to withstand the heaviest rated load with a very low thread pressure and are entirely free from sway. All bearings are bronze with Alemite fittings for greasing. The table is normally traversed by a manually operated ratchet. Electric power traversing can be furnished at an extra cost.

The truck is of standard structural steel members, carried on four wheels mounted on axles with roller bearings. The axles are radial and the wheels ground conical when used in a curved pit, but with straight axles and like diameter wheels in straight pits.

The guides are composed of flat steel, riveted together and drilled for bolting to the side of the pit by means of anchor bolts placed by the purchaser. They act as a means of guiding the table into position so that the rails on the table top and those on the engine-pit always match properly. The guides also act as a support for holding the table top in position to act as a bridge when the table is moved to another location.

The Wasco table has a normal vertical movement of 12 in. per minute. This may be varied to suit conditions. It is sometimes advantageous where time is an element of importance to use a two-speed table. This can be furnished at an extra cost. Where two speeds are used, the slow speed of 12 in. per minute prevails in the working zone and high speed of 24 in. per minute below. The change from one speed to the other is automatic. The table is built normally to raise the top four inches higher than the track rails of the engine pit for jacking purposes. This can be accomplished without unlocking the top, as the table is equipped with an upper limit switch to prevent over travel.

The tables are built normally of 50 tons capacity with a factor of safety of not less than five in any part. This capacity is sufficient for any class of drop pit work. The company is, however, prepared to build lighter or heavier capacity tables. Lighter designs are advantageous in tank shops, car shops, or car yards. Heavier designs sometimes are justified as an additional factor of safety in very busy terminals.

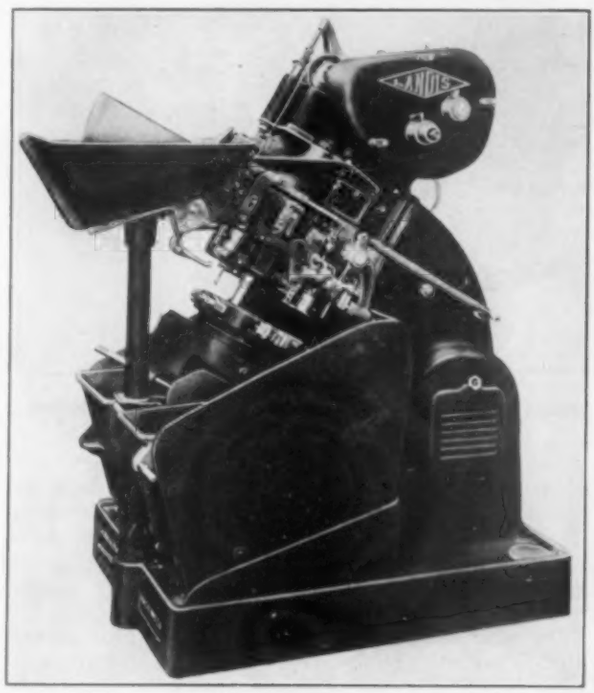
The motor is controlled from a control panel operated by a pendant push-button station which may be carried in the hand of the operator to the work he is performing. The push-button station has three buttons marked "up," "down" and "stop." The table has a four-point-supported top operated by four self-locking worm drives, always under perfect control of the operator.

The control is so built that during the period the table is doing close work in the upper zone a working zone is set to suit the purchaser, in which movement is obtained only by holding the "up" or "down" button depressed. The "stop" button is not used in the working zone. As soon as the table passes out of the working zone, an automatic control comes into play and the table will move in the direction started until it hits a lower-limit switch in descending or comes to the working zone in raising. The table then comes to rest. While the table is under automatic control, it may be stopped any place by depressing the "stop" button.

Landis Automatic Forming and Threading Machine

THE Landis Machine Company, Waynesboro, Pa., is exhibiting an automatic forming and threading machine which will produce bolts cut to length, pointed and threaded, from 5/16 in. to 3/4 in. in diameter and from 1 in. to 6 in. long under the head. It can cut a maximum length of thread of 2½ in. A number of features are employed which insures a full thread at the start, a more accurate lead and a minimum amount of taper. The machine employs a special ¾-in. Landex head and chaser. This is a revolving head of the pull-off type. It is made of high-grade carbon steel, is heat-treated throughout and ground.

The time element for the return of the forming and threading heads and the indexing of the turret chuck is constant, regardless of the diameter, pitch, length of thread, quality of material, or the threading speed. The



This Machine Will Automatically Cut to Length, Point and Thread Bolts from 5/16 In. to ¾ In. in Diameter and from 1 In. to 6 In. Long under the Head

instant that the forming and threading operations are completed, an automatically accelerated motion, entirely independent of the cutting speeds, withdraws the forming and threading spindles and indexes the turret. It is claimed that this feature increases the production from 10 per cent to 40 per cent, depending on the diameter, pitch and length of thread being cut. The constant time element also permits maximum speed for the smaller diameters of screws and for the shortest thread without endangering, in any way, the operating mechanism.

The turret chuck has three stations; one for unloading

and loading work, one for cutting to length and forming the end of the screws and one for threading. These operations are performed simultaneously. An ejector is provided at the unloading and loading station which will eject the bolt should it fail to drop from the grips.

Another feature is the operation of the chuck jaws which open and close on a pivot which is parallel to the bolt. This centralizes and squares the bolt regardless of any variation in size and insures concentricity of the thread with the body of the bolt. This feature also permits of the gripping of long bolts close to the part to be threaded without any sacrifice in the effective gripping pressure. Grips for holding any size bolt can be supplied with the machine. One set of cams covers the entire range of the machine. No retiming or adjustment of cams is necessary. The speed of the threading head can be quickly changed by means of change gears. Any change in the speed of the threading head effects a corresponding change in the speed of the forming head, but not in the speed of the indexing mechanism, which is constant.

Automatic safety devices that require no attention make it impossible for the machine or any of its units to be damaged by any obstruction. These safety devices are so placed that the machine functions without any retiming or adjustment after the obstruction has been removed.

The threading head is in an accessible position at the front of the machine in full view of the operator. It is screwed to the nose of the spindle which has a coarse pitch thread. This head is quickly removed without dismounting the yoke. The forming head is likewise accessible when the turret chuck is in lowered position. A clamping screw and a backing-up screw only are removed to replace the pointing tool. A pointer is provided for relocating the turret chuck. The turret chuck, its operating mechanism, the Geneva indexing movement and the lock bolt form a complete self-contained unit. This unit is fully enclosed and runs in oil. The complete unit is provided with an elevating screw so that it can be quickly raised or lowered for the various lengths of bolts.

The machine is hopper-fed. Bolt or screw blanks are shoveled by hand or dumped from a traveling bucket into the hopper and delivered to the transfer fingers through a magazine leading from the hopper. The transfer fingers move the bolts to the grips in the turret chuck. The length of the finished bolt is controlled by an adjustment of the transfer bracket. The transfer bracket is graduated for the various bolt lengths. An escapement is required for certain types of bolts. This attachment is incorporated in the front plate of the magazine and can be applied to the machine at any time.

The forming and threading spindles are mounted on Timken roller bearing. Both spindles are carried in slides which are provided with square bearings and tapered gibs. The spindle slides eliminate any excessive spindle overhang. The bearings are fully enclosed as a protection against chips and dirt. The threading unit is counterbalanced. By this means, the advance of the die head on the bolt during the threading operation is uniform and is under control at all times. This insures threads that are correct in lead.

The chasers are flooded by two streams of coolant which are delivered through the threading spindle and also through a nozzle located at the front of the head. The forming tool receives the coolant through the spindle. A rotary geared pump is employed to force the coolant to the forming and threading spindles. The reservoir for the coolant is located in the base of the bed.

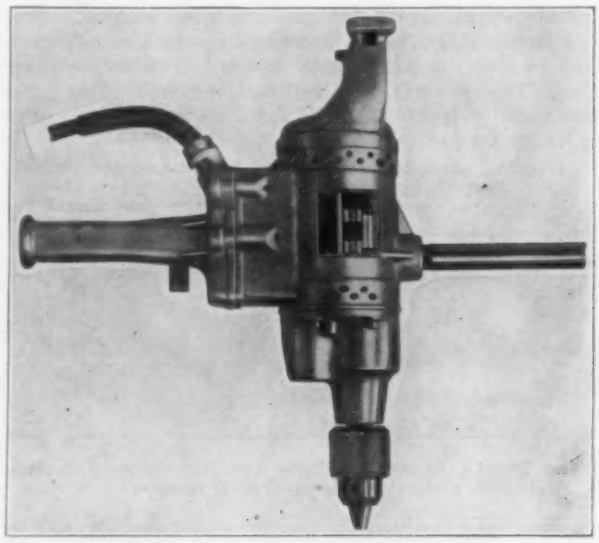
All shafts and those parts of the machine that are subject to heavy duty are made of special alloy steels and are heat treated. This insures maximum wear and reduces repairs to a minimum. All gears and cams are fully enclosed. Centralized lubricating systems are employed wherever possible.

The finished bolts and chips are collected in separate compartments. These compartments are set at an angle so that the bolts and chips can be dumped into containers. The doors, when lowered, form chutes to the containers. An oscillating conveyor may be employed for delivering the bolts at either the front or rear of the machine. This conveyor is fitted to the bolt compartment. It is perforated and has a return chute for the coolant. The delivery of the finished bolts and screws can be arranged to suit individual methods of handling as well as individual plant conditions.

The machine is furnished, either belt or motor driven. When belt driven, a single pulley drive is employed. When motor driven, the motor is mounted in the base of the machine and the power is transmitted to the main driving shaft by means of a belt.

High Frequency Electric Tools

THE Independent Pneumatic Tool Company, 600 West Jackson boulevard, Chicago, has developed an entirely new line of electric tools, with squirrel-cage motors, and operating on 180-cycle current. The type of motor employed in these tools is designed to eliminate armature windings, commutators and brushes which have been the seat of trouble in universal motor tools. The Thor rotor uses solid copper bars, riveted and welded in position. The gears are made of special high grade steel to withstand gruelling service. The stator case and gear case, the only other parts of the tool except the above, are of aluminum.



Thor High Frequency Electric Drill

The outstanding advantages of Thor high frequency electric tools are their exceptionally simple construction and light weight. The speed, which is practically constant, is another important feature from a production standpoint. The weight is about one-half that of a 60-cycle tool. This results in easier handling by the workmen, assuring greater efficiency and increased production.

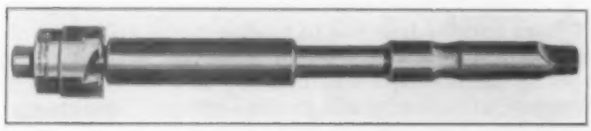
To use high-frequency tools, it is necessary to install a frequency changer to step up the current to 180 cycles. However, the advantages are so great, that it is said that any shop having ten or more portable tools in use, will find it both profitable and practical to make the installation.

The Thor line of high frequency 180-cycle electric tools is composed of drills, reamers, screw-drivers, tappers, nut setters, grinders and sanders. The range in capacity for drilling is from ¼ in. to 2¼ in. The tool illustrated weighs 15¼ lb., has a speed of 1,075 r. p. m. and can be used for ½-in. drilling, for ⅜-in. reaming, and for nut setting up to and including ¾ in.

Interchangeable Counterbores and Tube-Sheet Cutters

THE Bicknell-Thomas Company, Greenfield, Mass., is exhibiting a line of cutters, counterbores and drills that are interchangeable in their holders within their respective size ranges. Three of these tools are shown in the illustrations.

The standard counterbore cutter of the Christy XTY



The Type H Back Spot Facer

design, is shown with a four-fluted cutter and pilot assembled with the holder and also disassembled. This design has the advantage of enabling the user to renew any one of the three parts and use it with the other two. The cutter is furnished in a variety of sizes ranging from ½ in. to 4 in. and the sizes are grouped to fit eight different holders.

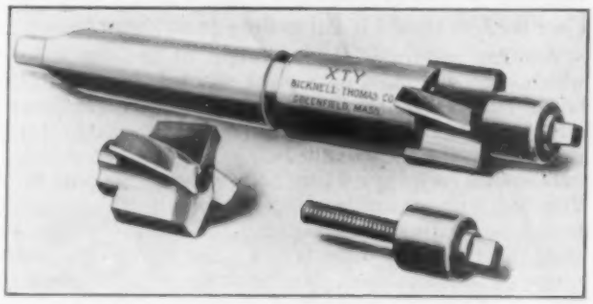
The flue sheet tool is designed to cut and countersink

The Type A Flue Sheet Cutter for Cutting and Countersinking Holes in One Operation

holes in flue sheets in one operation. The pilot is intended to enter a punch or drilled hole in the sheet and guide the cutter. The cutters are furnished with either two or four flutes and are constructed to withstand severe service.

The Type H back-spot facer has a double-key drive, with no pins or set screws, which insures more strength and accurate alignment under working pressure. The bars are made of an alloy steel, heat treated to withstand the driving strains. The high-speed back-spot facing cutters are also interchangeable and are easily removed by hand without the aid of wrenches. A feature of this tool is the pilot, which is interchangeable and is provided with either a slip or pressed fit. Solid pilots can be furnished when the interchangeable type has the wall worn too thin to permit interchanging.

All of the above tools are forged and twisted while



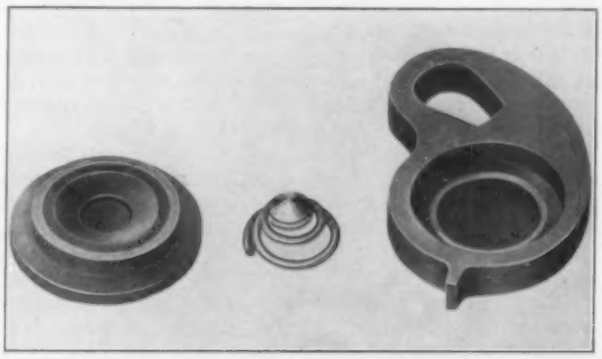
The XTY Design of Standard Counterbore Cutters

hot, which tends to increase the original strength and density of the high speed steel from which the tools are made.

Changes in the Everlasting Blow-off Valve

THE Everlasting Valve Company, One Exchange Place, Jersey City, N. J., is exhibiting a redesigned blow-off valve in which a helical spring has been substituted for a disc spring.

The conical spiral is so wound that no coil touches any other coil, even when complete compression places all the



The Redesigned Parts of the Blow-off Valve Showing, Beginning at the Left, the Disc, the Disc Spring and the Lever Arm

coils of the wire in the same plane. This has made possible a much greater spring pressure, and the use of a much larger diameter wire without increasing the length of the valve body. The spring is made of chrome steel, flashed with nickel, and copper plated.

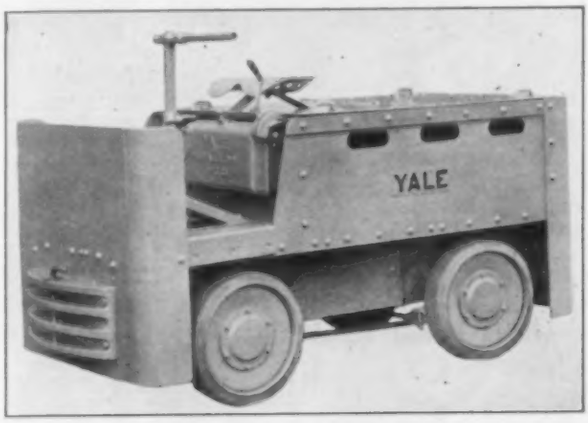
The disc spring, with its spherical apex which is placed against the disc, materially increases the rotating movement of the disc. To permit the use of the disc spring, the design of the disc and the lever arm had to be modified. The base of the spring fits into a recess in the lever arm.

These several parts, which are designated as Set 897K, are interchangeable as a set with existing lever arms, disc springs and discs, but are not interchangeable as individual parts with the corresponding parts formerly supplied.

Yale Tractor with Four-Wheel Drive

A TRACTOR with four-wheel drive, designated as Model K24C, which has been developed for the express purpose of meeting the demands for an electric-driven tractor of heavier type, is being exhibited by the Yale & Towne Manufacturing Company, Stamford, Conn. It is capable of maximum drawbar pull in excess of 4,000 lb., depending upon road surface conditions, and will operate a continuous drawbar pull of 1,000 lb. without danger of overheating.

By driving all four wheels of the truck, it is possible to get the maximum of traction with the given overall weight. This feature is particularly advantageous when the tractor is called upon to drive outdoors, between buildings where there is often ice and snow during the



The Model K24C Tractor Develops a Maximum Drawbar Pull of 4,000 Lb.

winter months. It has the same advantage when operating in plants with floors covered with oil.

The four-wheel brakes also provides the truck with the corresponding ability to stop. This sometimes may be considered more important inasmuch as it may involve the safety of workmen. The brakes on this machine operate through the differentials so that they properly equalize regardless of the condition of the lining. The spring which automatically applies the brakes when the operator either raises his foot pedal or steps off of the machine is directly connected to the brake shoes, so that any disarrangement of the linkage between the foot pedal and the brake lever would in no way endanger the driver of the machine. Should this linkage fail, the brakes would immediately apply and warn the driver that something was wrong.

The brake foot pedal has been made large so that it is possible comfortably to rest both feet on it, and it lies flush with the wooden flooring of the tractor. By a suitable arrangement of toggle joints, the pressure required to start the pedal in the release or downward direction, is greater than that which is required to hold it down, once it has been depressed. To apply the brakes, the foot pedal is allowed to rise. This automatically applies the brakes and opens the cut-out switch in the controller. Should the operator at any time, leave or fall from his machine, the brakes would automatically be applied and the power shut off.

Steering is through a lever handle so arranged that the handle may be folded up out of the way if the driver wishes to leave his seat. The construction of this folding linkage is rugged to prevent wear from developing with continued use. The steering knuckles on all four driving wheels are all equipped with ball thrust bears which lighten the burden of steering. This is an especially important item, as it permits the driver to whip his machine quickly when in tight places, thereby gaining every inch of the minimum turning radius of the truck.

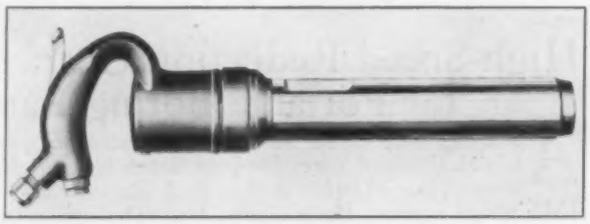
The driving units applied in this truck consist of two standardized units connected in parallel at the controller. The employment of standard units allows a maximum of interchangeability. It is only necessary to maintain one set of repair parts for all of the Yale truck and tractor models. This machine is regularly furnished with a 48-volt motor, and a 23 to 1 gear ratio.

The frame construction of the tractor is unique in that the pressed-steel side members or main supporting members are strong and integral parts with the axle yokes. This gives the frame a depth of 18 in., producing a member thoroughly capable of standing jolts and jars in addition to the usual bending stresses to which it is subjected. The bumpers are heavy, being made of ½-in. plates, and a triple bumper casting front and rear gives a range of coupling height that will meet practically every requirement.

Four Sizes of Riveting Hammers

A NEW line of riveting hammers in four sizes, having strokes of 5 in., 6 in., 8 in. and 9 in., is being exhibited by the Ingersoll-Rand Company, 11 Broadway, New York. The new hammers are said to be high in power, easy to operate and low in air consumption. They have several improved features of construction designed to insure reliable and economical service. An important feature is the manner in which the handle is fastened to the barrel and kept tightly in place by a spring locking device. The handle is threaded onto the barrel. The spring lock not only prevents the handle from unscrewing, but applies tension to tighten it automatically.

The valve operates in a hardened and ground valve box located at the head of the barrel and clamped in place by the handle. The valve is made strong and

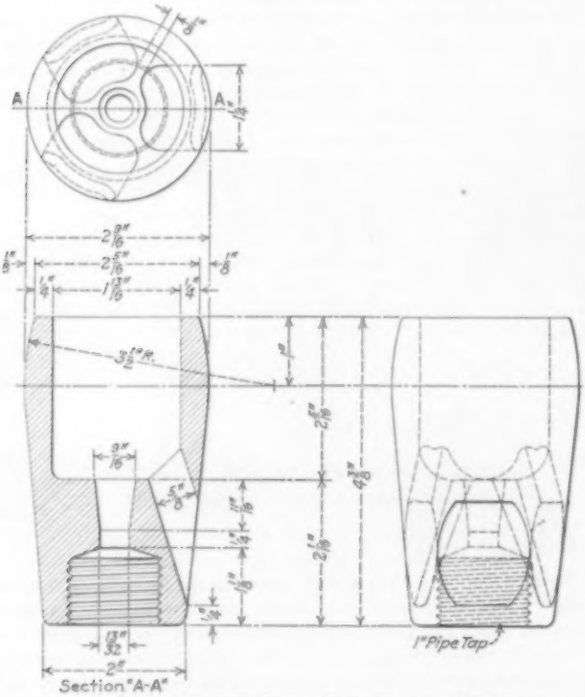


Ingersoll-Rand Riveting Hammer with the Air Cushion Completely Enclosed in the Valve Box

durable, having large bearing surfaces, and is free from any holes or ports from which there is a possibility of cracks starting. The valve box, which houses the valve, has a solid upper end which provides a positive compression chamber for the piston on its up stroke. It acts to prevent the piston from striking the handle end, as this air cushion is not dependent on an air-tight joint between the handle and the barrel. The barrel of the hammer is made of special steel, heat treated and ground to exact dimensions. An open type outside trigger handle is furnished as standard, but closed or unveiled type handles can also be supplied.

Front-end Blower Nozzle

THE T-Z Railway Equipment Company, 14 East Jackson boulevard, Chicago, is exhibiting a front-end blower nozzle designed to reduce steam and fuel consumption. This economy is effected by the 9/16-in. orifice, which obviously permits a considerably less quantity of steam to be used than regularly is consumed through 1-in. or larger pipe. The steam, ejected through the 9/16-in. orifice, expands in the combining chamber and creates the necessary vacuum to draw the smoke and gases from the flues, which are discharged out of the blower nozzle through the 5/8-in. slots provided around the bottom of the combining chamber.



Details of the T-Z Front-End Blower Nozzle

High-Speed Reduction Gear for Portable Boring Bars

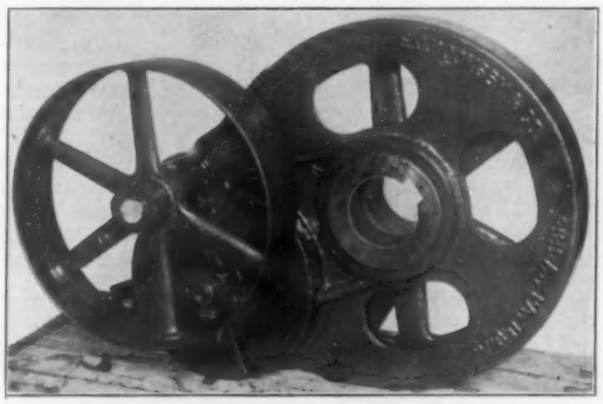
AMONG the portable tools being exhibited this year is a high-speed reduction-gear drive for portable boring bars, manufactured by E. J. Rooksby & Co., 1042 Ridge avenue, Philadelphia, Pa. This drive has recently been designed for reboring locomotive cylinders and valve chamber bushings.

Formerly, boring bars for this class of work were driven by a small steam or air engine and later by an air motor which was adapted for this purpose in railroad shops. In recent years, the use of electric motors for driving boring bars and other portable tools in railroad shops has been steadily increasing. The ratio of the reduction gears on boring bars of the later type, while suitable for use with air motors, was too low for driving by an electric motor, with the result that in many railroad shops the electric motors have been fitted with a back gear for this purpose.

The reduction gear shown in the illustration enables the boring bar to be operated by an electric motor without back gearing.

The reduction gear drive is now furnished regularly on all Rooksby portable boring bars for electric motor drive and while the ratio is high enough for slow or medium speed motors, it is easily within the range of speeds of standard air motors used in railroad shops.

The design uses a modern type of gear reduction and embodies the Rooksby safety-first gear guards. The driving shafts are provided with babbitt-lined bearings.



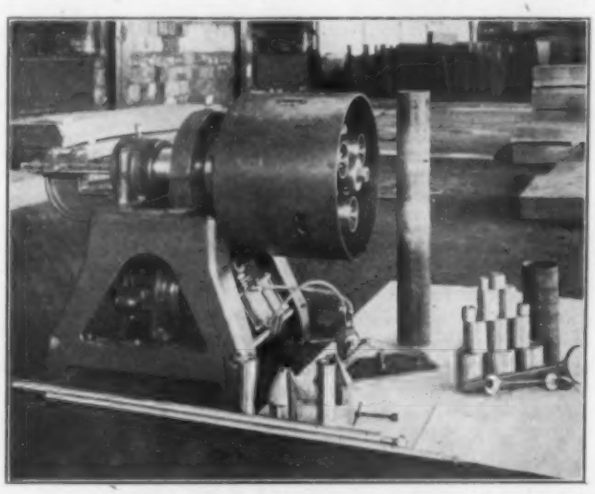
Rooksby High-speed Reduction Gear for Driving the Portable Boring Bars by Electric Motor

Machine for Rolling Flues of Any Size

JOSEPH T. Ryerson & Son, Inc., Sixteenth and Rockwell streets, Chicago, is this year exhibiting for the first time a flue roller capable of making safe ends and doing reclaiming work on any length or diameter of boiler tubes. In addition to this feature, the designers have developed a roller of light weight.

The rolls rotate about the flue in the usual manner, but the rolling down action is performed by means of an air cylinder actuated by a foot-controlled air valve. This method is easier for the operator and the labor required to roll a flue is considerably reduced.

The machine can be used on any size tube or flue



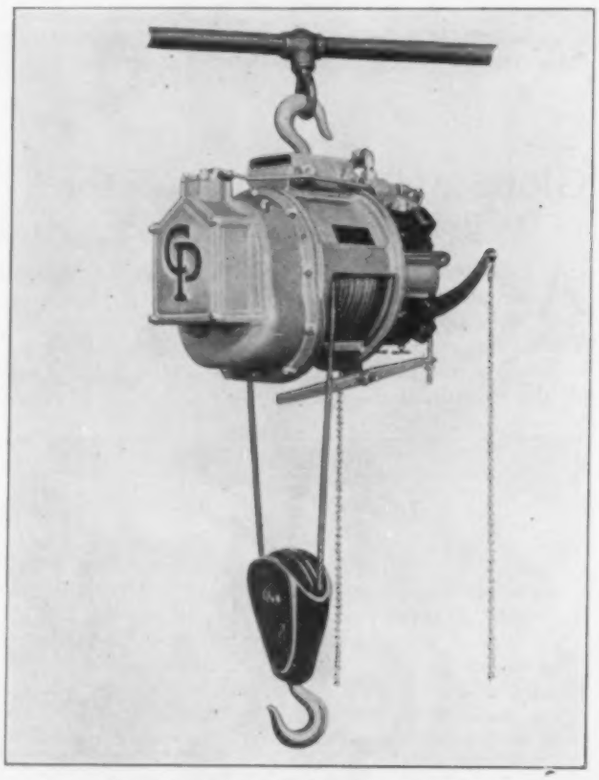
Ryerson Flue Roller Designed to Handle Any Size or Length of Flue

from the smallest to the largest by changing only the mandrel. The operation is simple. It is only necessary to remove one nut, slip off the mandrel, put on the size required and tighten the nut. The adjustment of the rolls for different sizes is the same as has been used on other Ryerson flue rollers, which involves turning an adjustment screw with a socket wrench.

The roller is operated with a 3-hp. motor on standard tubes and by 5-hp. motor on 6-in. superheater flues.

Four-Cylinder One-Ton Air Hoist

THE Chicago Pneumatic Tool Company, 6 East Forty-Fourth street, New York, is exhibiting the first of a new line of air hoists which embody such important features as increased speed of lift, a vibrationless motor, less head-room required because of compact design, a balanced type of control valve, smooth and positive control, and an enclosed type of load block. Additional hoists to complete this line will be added in the near future.



Chicago Pneumatic One-ton Air Hoist

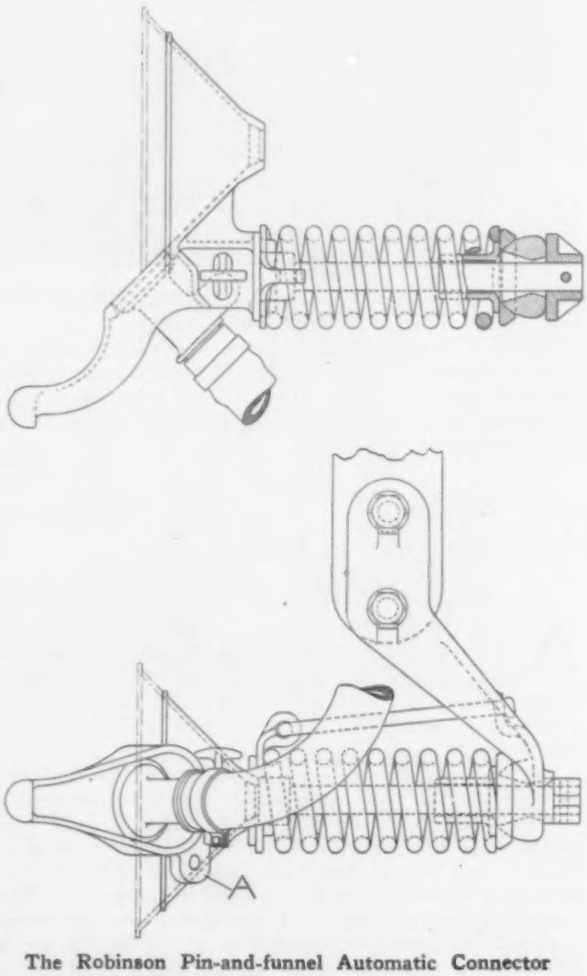
The single-acting motor has four cylinders, and operates with practically no vibration. The crank shaft runs on large size ball races and the valve mechanism is of the eccentric and piston type, allowing for short ports between the valves and cylinders. The control valve is of the taper plug type, adjustable for wear and is made of bronze. The reduction gears are of case-hardened steel, mounted on steel spindles which revolve in ball races. The cable drum revolves on a hollow stationary quill shaft. It is lubricated by an Alemite fitting in the cable drum and an Alemite fitting is also used to lubricate the internal gearing which drives the drum.

The brake drum is mounted on the end of the crank shaft which projects through into the gear box. The shoes are lined with asbestos brake lining and are held in contact with the drum by two springs, except when the load is being raised or lowered. The shoes are always equalized and are caused to release the brake drum by an air cylinder or piston which receives live air from the control valve just before and during the time that the control valve is admitting live air to the motor cylinder. This brake will hold the load even though the air line is disconnected. The 5/16-in. cable runs on to a grooved drum in a single layer, thus avoiding chafing or climbing.

The hoist has a maximum lift of 15 ft. and a lifting speed at rated load of 40 ft. per min. The lowering speed at rated load is 35 ft. per min. The weight of the hoist, not including the trolley, is 350 lb.

Redesigned Pin-and-Funnel Type of Automatic Connector

THE first connector designed by the Robinson Connector Company, 415 Lexington avenue, New York, was of the pin-and-funnel type. The accompanying illustration shows its latest development in the pin-and-funnel type of connector which is included

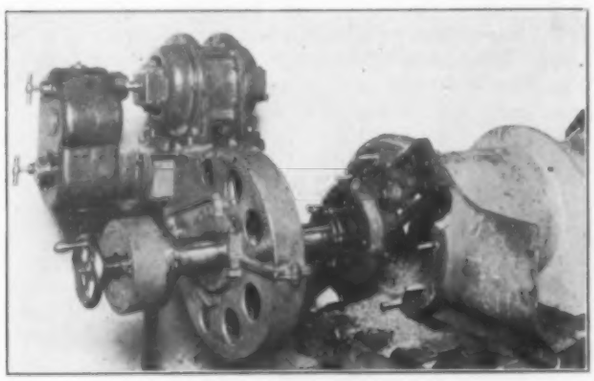


The Robinson Pin-and-funnel Automatic Connector

in the company's exhibit. The new features consist in passing the brake pipe air through the coupling head at an agle of 45 deg. to the longitudinal center line of the car, and in providing a variable gathering range. Heretofore, it has not been possible to increase or decrease the gathering range of the pin-and-funnel connector head effectively. Any alteration therein would destroy interchange with other units of equipment. In the construction here illustrated, the vertical and lateral gathering range of the coupling head may be varied as much as 2 in. each way and yet interchange with heads having a smaller gathering range. The support for this style of coupling head has the spring in front of the bracket, with a ball-and-socket universal joint.

Direct Connected Drive for Underwood Boring Bars

SHOWN in the illustration is a boring bar arranged for direct electric drive which is being exhibited by the H. B. Underwood Corporation, 1015-1025 Hamilton street, Philadelphia, Pa. It is arranged with a direct drive motor with a gear box having four changes



Underwood Boring Bar Arranged for Direct Electric Drive

of speed. The two pull pins on the gear box may be used separately or in conjunction with each other to give the four changes as required. This type of driving power can be used on all the standard equipments of the manufacturer.

A Focusing Device for Locomotive Headlights

A FOCUSING device, entirely without adjustment screws and without the possibility of a single screw coming loose, are the claims made by the Dressel Railway Lamp & Signal Company, Arlington, N. J., for a locomotive headlights device which is included among this company's exhibits.

The focusing device is an application of the ball-and-socket principle. The lamp socket, which is furnished in either porcelain or molded composition, is held in a sleeve made of spring brass. This sleeve is split along its axis and has, at about its middle, an internal bead which fits in a corresponding groove in the socket. This bead prevents the socket from sliding in the sleeve. Around the sleeve is placed two semi-spherical shells. The movement of the sleeve in the shells provides the longitudinal adjustment of the lamp filament. This movement is limited by an external bead on the sleeve, fitting into a clearance in the shell. This clearance will allow for ¾-in. longitudinal movement. The shells, in turn, are held together by a two-part socket of which one part it riveted on to the reflector back while the other is provided with a hook to interlock with the fixed half of the socket in the one end and is locked with a lever handle in the other end.

The action of the focusing device is extremely simple. When the handle is moved away from the reflector back, the focusing device is released for adjustment. By grasping the sleeve, through which the lamp leads enter, it can be moved forward and backward at will. A slight twisting motion enables the operator to obtain the most accurate focus. The transverse adjustment is attained in the same way, merely by pressing on the sleeve in the desired direction.

When a filament is in focus, the lever handle is pushed into the locked position. The pressure from the lever handle is transmitted through the clamping shells to the sleeve and socket, making the entire focusing device rigid. The tension of the lever handle is adjustable by a screw. The handle must be unlocked and extended straight back in order to turn the screw, thus preventing the screw from being loosened by train vibration.

Globe and Angle Valves for 250-lb. Working Pressure

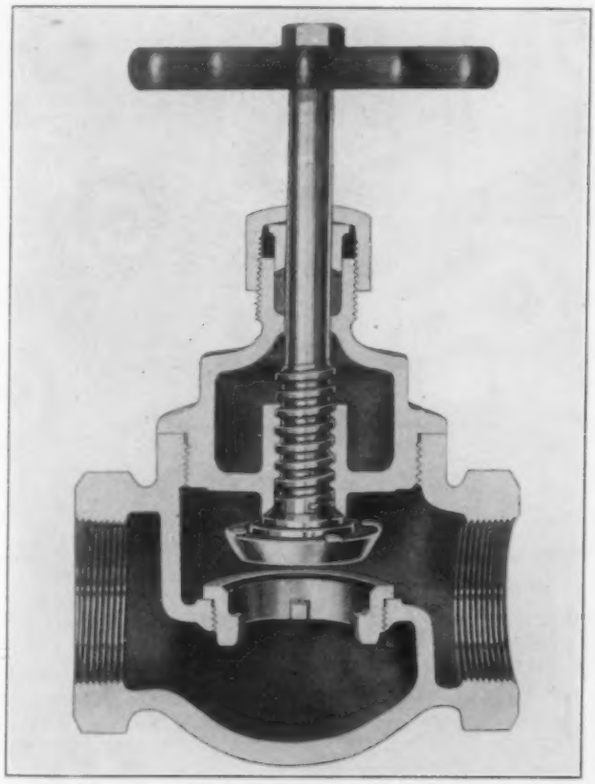
A LINE of bronze globe and angle valves, suitable for 250-lb. working steam pressure, are being exhibited by Jenkins Brothers, 80 White street, New York. Each valve is provided with a deep stuffing box and follower. The spindle threads are in contact with all the threads in the bonnet when the valve is closed.

Jenkins Globe Valve Designed for 250 Lb. Steam Pressure

The valves are provided with a renewable resilient disc of suitable composition to withstand the high pressures for which the valve is recommended. The valves are provided with renewable seat rings.

Refinements in Globe Valves

THE globe valves, designated as the Replate and Perfection types, have been redesigned and are being exhibited by the Central Valve Manufacturing Company, 217 Railway Exchange, Chicago. The Replate valve is designed for steam working pressures up to 300 lb., with temperatures to 550 deg. F. The bodies and bonnets are cast from special valve ingot,



The No. 321 "Replate" Globe Valve

the stem and head being made from forged or cold drawn brass. The head of the stem is capped with a removable cold-rolled nickel plate, formed to give a ball-joint effect, and fully supported by the end of the stem. This head plate, working against a Monel metal removable seat, offers sufficient variation in the hardness of the two metals to make a complete bearing and exceptionally tight joint. The nickel head plate, being somewhat softer, takes the majority of the wear, and is readily replaced without removing the valve from the line.

An unusual feature in this assembly is in the adaptability of the end of the stem to function as a head plate in an emergency, thus producing a complete valve where an extra plate is unavailable. However, in the interests of economy, a supply of plates should be on hand. The Monel seat can be replaced at low cost, or can be reground, if so desired.

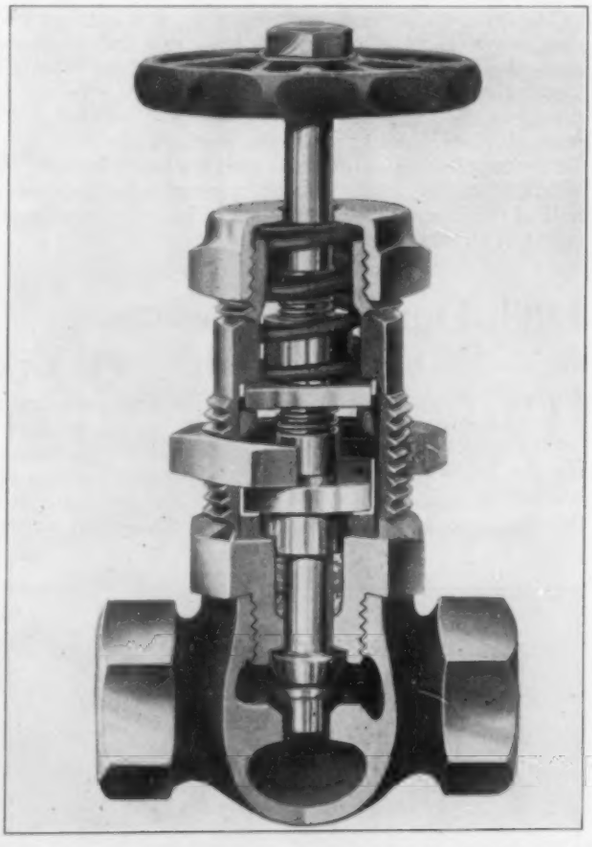
Repacking may be safely done under wide open pressure as well as in a closed position, as a complete joint is formed between the bonnet and the head of the stem.

The advantages of a short stem and bonnet have been incorporated in this valve, giving added ruggedness and reducing to a minimum the space required for installation. In addition, a large dead air space in the bonnet prevents rapid transmission of heat from the body to the handle.

Each valve is tested under 400 lb. hydraulic pressure, and the seat joints tested by air under water. The lift of the valve in all cases is sufficient to pass more fluid than the standard pipe size will conduct.

The self-grinding Perfection valve is especially adapted to conditions where scale, sediment, and other solid matter is frequently contained in the water.

The mechanical action involved in the operation of these valves results in a clean and smoothly ground valve seat at all times, in spite of the most severe working conditions. As the stem comes to a seat in the body, the threaded section of the stem being engaged with the threads in the spring block, the latter moves upwards on the stem against a short spring. The pressure of this spring against the block holds the valve to its seat. Further rotation of the stem brings the spring block solidly against its upper stops in the bonnet and the valve to a firm seat. Meanwhile, the stem has been revolving on its seat and has pulverized and removed any dirt or scale on the seat, and has ground itself to a tight joint. Where additional grinding is necessary, a short movement of the hand wheel back and forth in closed position is sufficient. Thus, a



The No. 331 "Perfection" Self-Grinding Globe Valve

clean seat is automatically maintained throughout the life of the valve by the normal opening and closing it receives in service.

A shoulder on the head of the stem makes a tight joint on the inside face of the bonnet, when in wide open position, allowing for repacking under pressure in both the closed and wide-open position.

The stem threads, spring and spring block are all located above the packing, making them easily lubricated and at the same time protecting them against the ill effects of heat and corrosion that would arise from their being located inside the bonnet.

The spring-retaining cap at the top of the bonnet may be adjusted up or down within such a range as to control the grinding pressure on the seat according to the varying operating pressures, and hardness of the impurities encountered.

SKF Spherical Journal Bearings For Engine Trucks

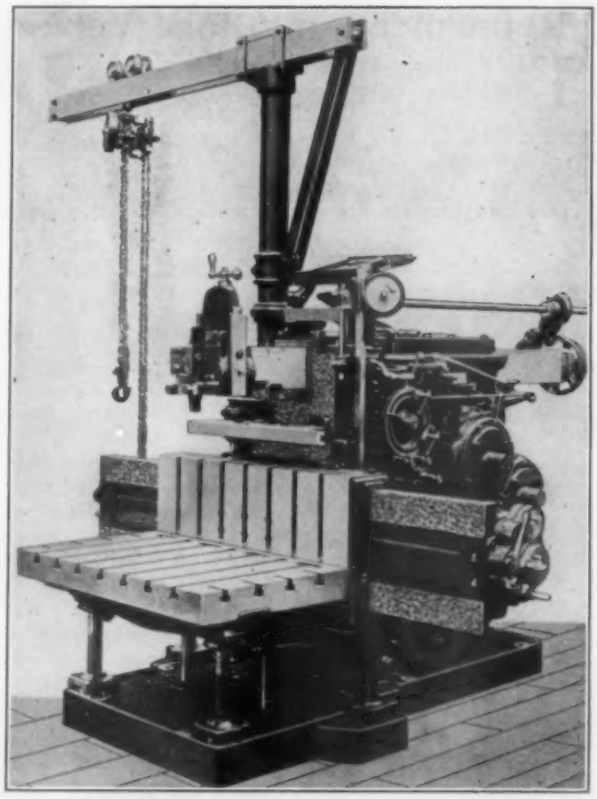
AN engine truck equipped with spherical journal bearings is included in the exhibit of the SKF Industries, Inc., 40 East Thirty-fourth street, New York. It is illustrated at the bottom of this page.

When applying the bearings, the inner races are shrunk on the axles and held in place between the spacing collars and the wheels. The journal boxes are of cast steel, split on the horizontal center line and bolted together in place after the application of the bearing. The trucks can then be built over the wheel and axle assemblies in the usual way.

The bearings are only removed when it is necessary to change wheels, at which time the inner race and wheel are pressed off together. Inspection of the bearings when the locomotive is in the shop for repairs can be effected by dropping the axles out of the truck and removing the journal boxes. All parts of the bearings are then completely exposed. The lubricant used is a heavy cylinder oil which is carried in the oil cellar, constituting the lower half of the journal box. Addition of oil at infrequent intervals is all that is necessary.

High-Duty Draw-Cut Planer for Railroad Work

THE Morton Manufacturing Company, Muskegon Heights, Mich., is exhibiting a high-duty draw-cut planer which is designed especially for machining the frame fits in guide-yoke-tie braces and cross-tie braces. It will also machine the guide fits on back cylinder-head blocks, locomotive deck castings, the casting units between cyclinders, or any other work that will come within its range.

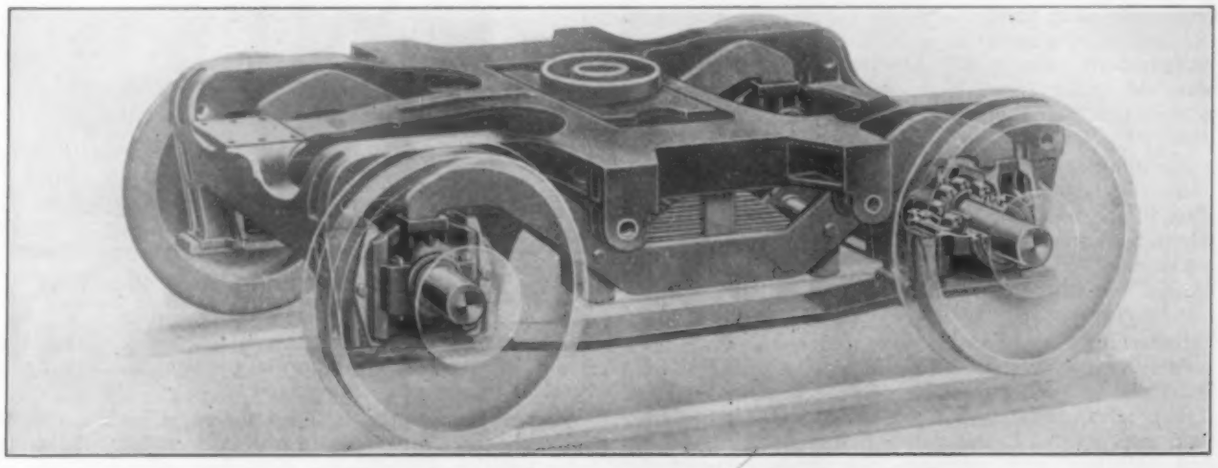


Morton Special Railroad Shaper Showing the Special Knee Removed from the Lower Table

This machine has 38 in. of cutting stroke, 60 in. of horizontal feed and 21 in. of vertical feed. It is of the four-screw type, which makes possible the handling of large and bulky castings. Rapid power traverse, both horizontal and vertical, is embodied in this machine. All the feeds are automatic and can be changed while the machine is in operation.

This new draw-cut shaper is of the Morton special railroad type with a rotating arbor for slotting and finishing driving boxes. It will also accommodate all special Morton attachments for railroad work.

* * * *



Phantom View of S K F Spherical Journal Bearings as Applied to an Engine Truck

The Walworth Master Stillson Wrench

THROUGH a period of years, engineers of the Walworth Company, Statler building, Boston, Mass., with some of the country's foremost metallurgists as consultants, have studied the processes of Stillson wrench manufacture and the heat treatment of drop-forged steel, of which Walworth Stillson bars or handles and jaws are made. The successful outcome of these studies when applied to actual manufacture has resulted in the Master Stillson wrench which is being exhibited at the Walworth Company's booth.

Several results were sought when the problem was first attacked. Uniform quality of product was essential and maximum strength consistent with flexibility which

A Demonstration Test of the Master Stillson Wrench

would permit bending before breaking, was necessary. Also, greatly increased strength was sought. This included, as a problem separate from strengthening the bar and jaw, increasing the strength and hardness of the teeth. It was necessary to give the teeth maximum hardness short of brittleness.

The handles and jaws of the Master Stillson are drop forged from bars of a high-grade carbon steel. However, it was discovered that the grain structure of the forgings was not uniform and could not be, under the conditions necessary in the operation. Electric annealing furnaces were, therefore, secured and the cycle adopted assures uniformity of structure in the wrench parts and a structure best suited for machining. The uniformity of structure is most important in connection with the heat-treating and hardening processes which follow the machining operations. Entirely new equipment for these processes was installed and a long period of experiment followed before satisfactory results were obtained.

A slight change has been made in the angles of the bar and jaw teeth, a change which increases the base of the teeth and gives added insurance against their shearing off or flattening under the shocks or excessive strain.

The Walworth Stillson passes through five heat treatments, all controlled electrically, which secures 50 per cent increased strength, as demonstrated by many tests. A unique testing device has been made to show the strength of the wrench. In this test an invitation is extended to anyone to place his weight on a lever which brings a load of approximately 7½ times the tester's weight to bear on the Master Stillson bar at a point 1½ in. from the end. It has been found that the Master Stillson actually withstands a load of 1,800 lb. without damage.

Pipe Machine with Rotary Die Head

THE Williams Tool Corporation, Erie, Pa., is exhibiting this year for the first time the new "Rapidrotary" pipe and nipple threader. This machine is especially designed for increasing threading production on bent piping and repair work. The principal feature of the machine is the rotary die-head and the range of spindle speeds is such that it gives an average cutting speed of 19 ft. per min. This type machine reams the burr from the inside end of the pipe at the same time that the threads are being cut.

An important time saving feature is the automatic die trip, a cam and lever device which releases the dies automatically from the pipe the instant the thread is finished and closes the dies automatically when the pipe is inserted. This cam and lever trip is controlled by a single handle which is located at the front of the machine.

The Williams Pipe Machine Reams the Burr from the Pipe as the Threads Are Being Cut

The dies in the Williams machine are of small size and made of high-speed steel with the idea of making them easy to handle and of reducing the die cost to a minimum. Four sets of dies cover the entire range of the machine, which is from 1-in. to 4-in. pipe normally, although the machine may be used to advantage on ½-in. and ¾-in. pipe. The machine is gear driven from the motor and all gears operate in an oil bath.

Smith Journal and Frame-Bolt Jacks

SOME interesting new shop tools are being exhibited by The Clark Manufacturing Company, 427 North Thirteenth street, Philadelphia, Pa., chief of which is the Smith multiplex frame-bolt jack, shown in two of the illustrations. This tool will back out tight frame

The Smith Journal Jack Used in Conjunction with the Rail-Hook Pedestal

bolts in places where it is impossible to swing a hammer. Because the pressure is applied gradually, the end of the bolt will not mushroom, as frequently happens when a hammer is used. This jack eliminates the necessity for drilling out bolts and saves considerable time.

Other uses are backing out cylinder bolts and bolts used in connection with spring rigging, equalizers, etc. It is of value in pulling valve or cylinder bushings back in place after they have slipped or worked out of place,

The Smith Frame-Bolt Jack Has a Capacity of 150 Tons

and it can also be employed to advantage in setting machinery where extremely accurate height is necessary. It will work in a space only 3⅞ in. wide, has a capacity of 150 tons and can be easily handled by one man.

Several sizes of extension screws for use in connection with the frame-bolt jack are also being exhibited. These are of various lengths and are adjustable so as to act as fillers between the jack and bolt end. They may also be used independently in spreading frames and similar operations.

The Smith multiplex bridge-and-building jack is another tool that is being exhibited. It operates easily in

Application of the Frame Bolt Jack

unusually close places, is light handling for one man and has a capacity of 150 tons.

The Smith rail-hook pedestal is a device that hooks over the rail and furnishes a dependable footing for various types of journal jacks. Its use eliminates wood blocking, or the spotting of a car to remove journal brasses, and requires only the rail itself to furnish a sure footing.

The Smith multiplex lifter, shown in one of the illustrations, is a compact and light lifting device with a capacity of 35 tons and a variety of uses. It is adapted for removing brasses from car journals, especially when used in conjunction with the rail-hook pedestal.

Another new development of Smith multiplex power on exhibit, is a tool for removing pinions from armature shafts on electric locomotives. This completely eliminates any possibility of damage to the motor housing or pinion and does the work quickly and easily. It has been in successful test operation for several months in a large electric shop without a single case of failure or breakage.

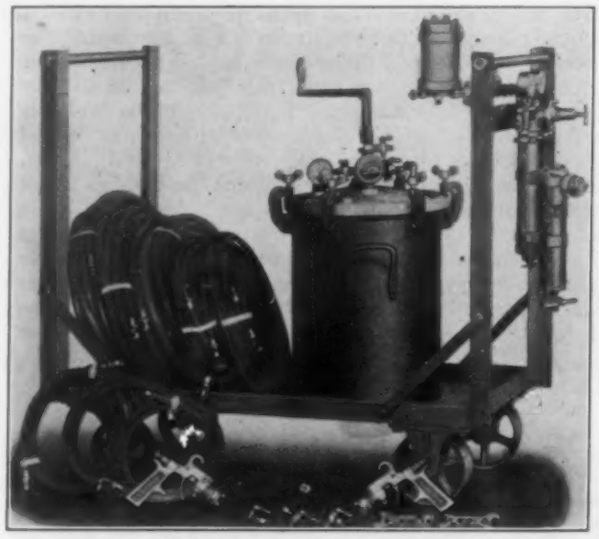
The latest Smith tool is the multiplex grip, an ingenious arrangement of wedges and rollers which, when under pressure, act as a positive grip on any surface or shape, but releases easily and instantly when pressure is removed. It may be used for many other purposes such as pulling cables, shafts, casings, etc.

Spray Painting Outfit for Coach Work

THE illustration shows a spray-painting outfit especially designed for exterior coach work by the De Vilbiss Company, Toledo, Ohio, which consists of several units conveniently mounted on a portable truck. The outfit is arranged for two operators and is provided with two De Vilbiss type AV spray guns, with adjustable heads, together with the necessary 50-ft. lengths of air and fluid hose. The type AV spray gun was described in detail in the February, 1928 issue of RAILWAY MECHANICAL ENGINEER, page 120, and is of the type which has a positive control, enabling the operator to produce

any graduation of spray from a round concentrated spray to a wide fan-shaped spray.

This outfit is equipped with a type QM, 10-gal. pressure-feed paint tank which is a straight-side tank with a clamp top. This gives an opening the full diameter of the tank when the top is removed, facilitating cleaning and permitting the insertion of a full-sized container. The pressure tank may be furnished either with or without the agitator which may be operated by hand or with



The De Vilbiss Portable Outfit is Designed for Two Operators on Exterior Coach Work

an air motor. The ilustration shows a tank with the hand type agitator. The tanks are made of seamless steel with a welded bottom and are heavily lead-tin plated. On the tank cover are mounted the air regulator, pressure gage, safety valve, relief valve, air and fluid cut-off valve and fluid outlet tube. The air regulator is used to vary the pressure on the material in the tank, thus obtaining, under varying conditions, the best flow with materials of any weight and viscosity. The insert containers, which are heavily tin-plated are fitted with a bail to facilitate easy removal and replacement. Additional insert containers may be kept on hand with covers containing different materials so that a minimum of time will be lost in changing.

Included in the equipment is the De Vilbiss type HL air transformer which effects the removal of oil, water and dirt usually found in an air line, thereby preventing refects in the applied coatings. This device not only eliminates the moisture, oil and other foreign matter from the air but also provides means for indicating and regulating the air pressure used at the nozzle for atomizing the finishing material. Two spray guns can be connected to one transformer whenever two guns are used alternately—for instance, in painting an article in two colors, or in part with two different materials, at the same operating and in the same spray booth.

In order to obtain the best results with varnishes and enamels, overcoming pebbled or pitted effects, it has been found necessary to heat both the fluid and the air in order to counteract the natural cooling tendency of the expanding air. The type EG heater, which is furnished as extra equipment, has been developed for this purpose and is designed for use with one spray gun. It clamps to the air transformer and is furnished with the necessary air and fluid hose and connections and equipped with a three-point switch. Both the air and the fluid pass through the heater, the heat being applied at the point nearest the nozzle in order to minimize the temperature drop. The fluid is heated only as needed, enabling the operator to obtain the heated fluid without delay when he starts work. There is practically no evaporation of the solvent, cooking or deterioration of the varnish or enamel, as is often the case when the fluid container is kept hot, and for the same reason there is little, if any, loss by radiation, effecting an economy in current consumption. The variation in the temperature of the fluid is negligible, whether used fast or slow, as the small amount contained in the heater is quickly heated to the desired point.

Crowe Type CC-16 Safety Saw

THE Crowe Manufacturing Corporation, Cincinnati, Ohio, is exhibiting this year, among other types of portable electric safety saws, its new type CC-16 saw which has been especially developed for work on heavy timber where a cross-cut saw of the hand type would ordinarily have to be used. This new type saw will cut through timber to the depth or thickness of 6⅛ in. and will, by turning the timber over, cut a piece 12 in. in thickness. By actual test this saw is said to be able to cut through a 14-in. by 6-in. timber in 20 sec. The illustration shows the saw being used in 6-in. by 10-in. timbers which were cut through in 15 sec. by one man. Two men with a cross cut saw would require about 240 sec. to do the same work.

The type CC-16 Crowe saw has been designed to operate on ordinary lighting current, and, where electricity is not available, the saw may be furnished with an air

Both Hands are Used in Operating the Crowe Safety Saw. The Safety Features are Automatic

motor as the source of power. The body of the tool is made of an aluminum alloy providing minimum weight in order that one man may readily handle it without fatigue. The saw blades are made of a special saw steel which will permit filing the saw down to considerably less than the original diameter. The fan and shafts are balanced to minimize vibration and are mounted in heavy-duty ball bearings. The type CC-16 is equipped with the Crowe safety features which are automatic in operation. In using this saw, after making a chalk line as a guide, the front guide on the saw is placed lightly on the work before the motor is started. This raises the saw guard, the motor is then started by the use of the trigger switch and the saw is gradually fed into the work keeping the finger on the trigger at all times. After the cut is completed the trigger is released, stopping the motor and the safety guard returns and locks in the safe position.

The Waugh-Gould Type G-1 Draft Gear

INCLUDED in the exhibit of the Waugh Equipment Company, Chicago, is a draft gear for replacing G-springs or friction springs in tandem yokes without the removal of thimbles or cheek plates. It fits the same

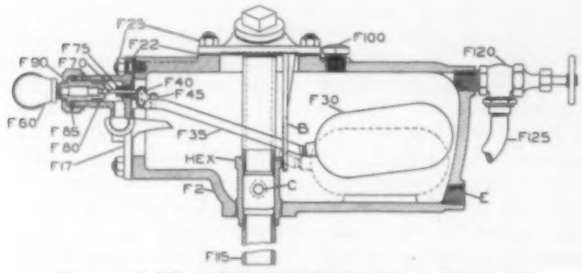
The Waugh-Gould Type G-1 Draft Gear

space as the G-springs and requires no changes in the cheek casting or yoke. No follower blocks are required.

A tandem yoke with two G-springs has a capacity of 60,000 lb. By replacing one spring with a Type G-1 draft gear, it is claimed that the spring capacity is raised to 210,000 lb. and by replacing both springs with Type G-1 draft gears, the capacity is increased to 360,000 lb.

The Cleveland Float Low Water Alarm

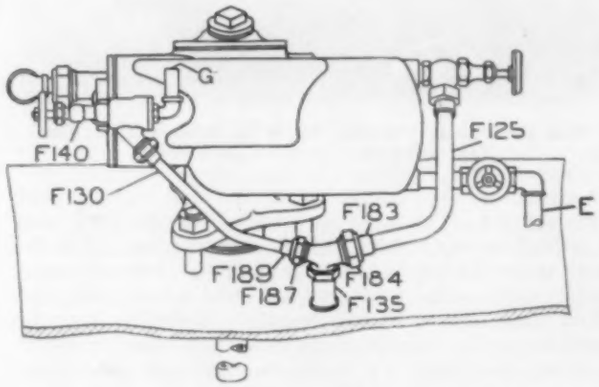
THE Talmage Manufacturing Company, Cleveland, Ohio, is exhibiting its Type F-2, Cleveland float, low-water alarm. The alarm proper is located on the outside of the boiler at a point slightly ahead of the



Sectional View Showing Float, Drop Pipe and Whistle Valve

rear tube sheet and contains a copper float the rise and fall of which controls the passage of steam to a whistle mounted on the end of the alarm body. From the top inside of the float chamber a 1¼-in. copper pipe extends down into the boiler to the level below which the water cannot go without operating the alarm. Near the bottom of the float chamber there is small drain port *C* opening into this copper drop pipe.

Whenever the boiler is under pressure and the water in the boiler is above the end of the alarm drop pipe, water is forced up into and completely fills the float chamber, causing the float to rise and keep the whistle valve tightly closed. When the drop pipe is uncovered a sufficient length of time, as in the case of low water, the water in the float chamber runs back into the boiler through the port *C* permitting the float to fall and the alarm whistle to sound until the water in the boiler is again recovered. The alarm whistle does not sound when the drop pipe is momentarily uncovered, due to surging or other operating conditions, as it takes about 50 sec. for enough water to run out through the drain hole to lower the water in the float chamber to the point at which the float starts to fall and open the alarm-whistle float control valve. To cause this alarm to function in exactly the same manner as in the case of low water, it is only necessary to open the test



The Alarm Mounted on the Boiler, Showing the Location of the Test Valve

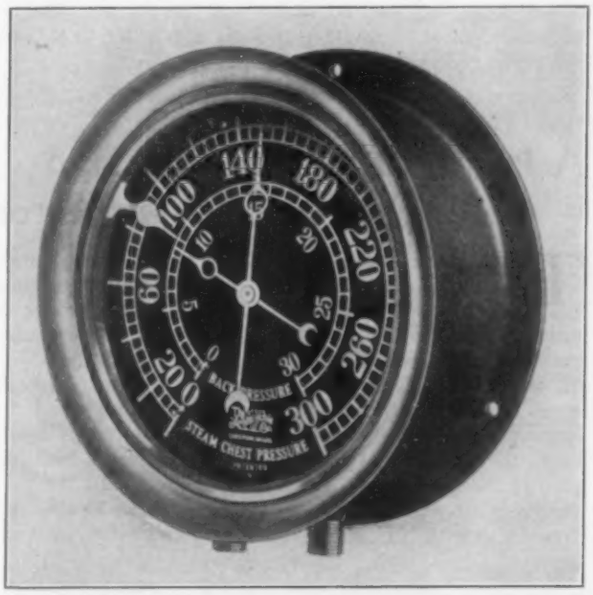
valve *F-120*. This permits steam to enter the float chamber and equalize the pressure and thereby permit the water to drain back into the boiler by gravity. To prevent the continual blowing of the alarm whistle whenever the water is purposely lowered as at washout periods, the shut-off valve *F-140* is provided but whenever the alarm whistle is so cut out the escaping steam from the bleed line *G* indicates this condition.

The alarm body is exposed to the atmosphere and the water therein is much cooler than that in the boiler. Therefore the only place that scale forms is at the lower end of the drip pipe, which is easily taken care of at the monthly washout through the plug in the top cap which lines up with the interior of the drop pipe. Any sludge that might collect in the float chamber can be readily blown out at the valve *E*.

Designed to be dependent only on the level of the water in a boiler under pressure, the Cleveland float low-water alarm will give a warning with any desired amount of water over the crown sheet. Reference throughout this description is made to the illustrations which bear the legends of assistance in clearly realizing the device.

Changes Made in Ashton Back-Pressure Gages

THE Ashton Valve Company, 179 First street, Cambridge, Mass., is exhibiting its 6¼-in., No. 62-B. A. A. locomotive duplex back-pressure gage, to which has been added a lazy hand, and also its



The Locomotive Duplex Back-pressure Gage Provided with a Lazy Hand

No. 62-B. P. duplex back-pressure and vacuum gage, in which the window through which the back pressure is

The Duplex Back-pressure and Vacuum Gage Showing the Location of the Window Through Which the Back-pressure Dial Is Read

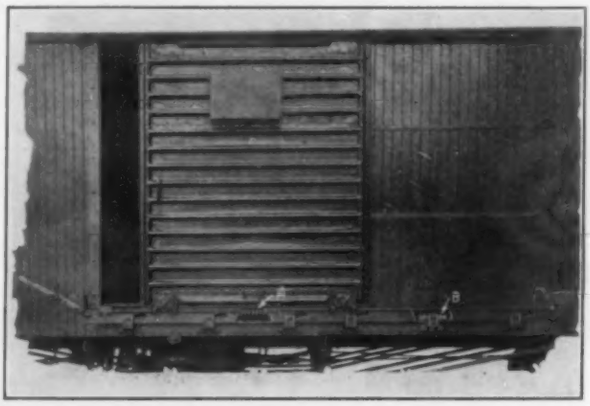
read, has been more conveniently located on the main dial.

The object of adding the lazy hand to the first-mentioned gage is to enable the road foreman or locomotive engineman to set the hand on the back pressure scale to the pressure at which the locomotive will operate to the best advantage. With the hand once set to the proper back pressure, each engineman assigned to the locomotive will know what back pressure to maintain for the best performance. The lazy hand is set by removing the threaded face ring of the gage and moving the circular spring, to which the hand is attached, to the desired position.

In the duplex back-pressure and vacuum gage, the window through which the back pressure dial is visible has been moved from the vertical center line to the right horizontal center line. This change was made to avoid interference or overlapping of the steam-chest-pressure gage hand.

Self-Locking Freight Car Door

A SELF-LOCKING freight car door which may be locked or unlocked in any desired position, either fully open, partially open, or closed, is being exhibited by Baldwin & Conrad, Eldon, Iowa. When the lever, shown to the left in the illustration, is raised, the track is lowered. In this position the rollers do not touch the track when the door is locked. This feature prevents the rollers from wearing flat by the back-and-forth vibration of the door. When in the locked position, the teeth A engage with the teeth in the track brackets B.



The Baldwin-Conrad Door Showing the Distance the Door is Kicked Open by the Trip When the Lever is Lowered

This arrangement prevents the possibility of horizontal movement toward opening or closing. When the door is in the lowered or locked position, it is jammed tightly against the door post, completely sealing it.

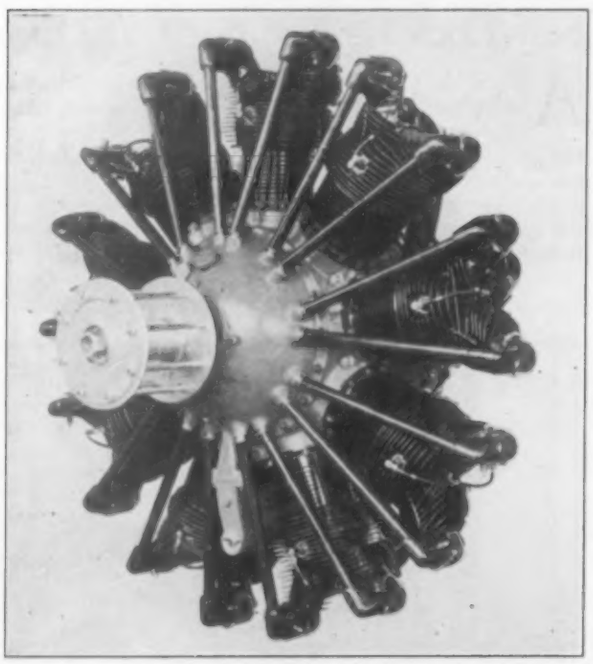
When the lever is lowered, the track is raised. The teeth are then completely disengaged and the door rollers rest on the track, permitting easy opening or closing of the door. While in this position, the door is pulled away from the car by the flanges on the rollers. This feature is to prevent the door from sticking even when the side of the car is bulged. A jar sufficient to move the door on its rollers will automatically lower the track, causing the door to lock in that position without horizontal movement.

The lever is so designed as to permit a man to affix a seal, or a padlock and seal, without climbing off of the ground. The hood at the top is weather-proof and acts as a slidway for the door when it is in the raised or unlocked position. When the door is lowered, the hood assists in pressing the door firmly against the door post.

A Radial Nine-Cylinder Air-Cooled Aeroplane Engine

THE Pratt & Whitney Aircraft Company, Hartford, Conn., is exhibiting this year for the first time one of its nine-cylinder, air-cooled, fixed radial type motor for aeroplane service. This company manufactures two types of engines designated as the Wasp and the Hornet. In type of details the design of the two engines is the same, the primary difference being in the size. The Wasp has a piston displacement of about 1,340 cu. in., and the Hornet, about 1,700 cu. in.

The illustration shows a front quarter view of the Wasp which has nine 5¾-in by 5¾-in. cylinders which



The Wasp Nine-Cylinder Air-Cooled, 400-hp. Aeroplane Engine which Weighs 650 Lb.

develop 400 hp. at 1,900 r.p.m. and 450 hp. at 2,100 r.p.m. The fuel consumption is .55 lb. per hp.-hr. at rated power and the oil consumption, .035 lb. per hp.-hr. The engine weighs, without the hub or the starter, 650 lb.

Briefly, the aluminum forged crankcase is divided in the plane of the cylinders into two similar sections which are held together by nine through bolts between the cylinders, as well as by the cylinder flange. The blower or mounting section supports the engine in the aeroplane and is attached to the rear of the main crankcase. The supercharger is carried in this section, together with its gearing. The mixture is fed through the impeller into an annulus in the blower section, and thence to the cylinder by the tangential pipes. The rear, or accessory section, is attached to the blower section.

A unique feature is the division of the engine into two assemblies, the power section consisting of the main case, the nose section, cylinders, crankshaft, connecting rods, etc.; the accessory section, including the blower, is at the rear. The power section may be removed from the accessory section in plane and the latter left attached to the fuselage.

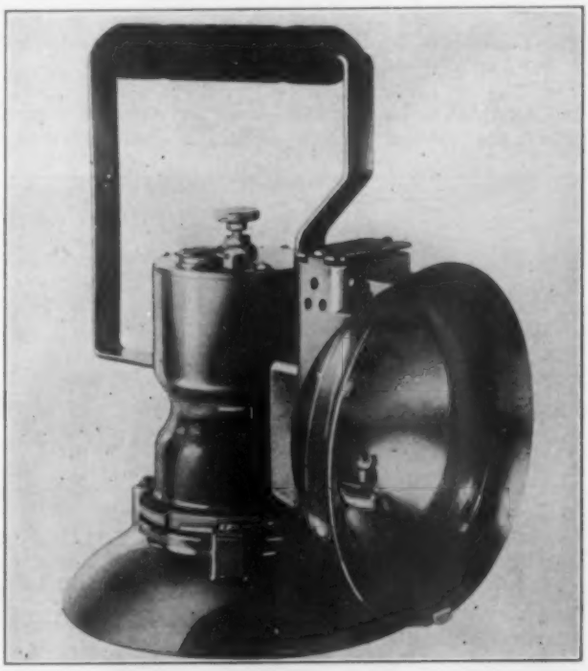
The crankshaft is built up of two sections. The master connecting rod has a solid, instead of a detachable, cap. Eight I-section link rods are attached by knuckle pins to the master rod. The master connecting rod fits over the main and only crank pin.

The cylinders are built up with an aluminum head screwed and shrunk into a steel barrel having integral fans.

A novel feature of the cylinder design is that the rocker arms are carried in housing which are integral with the cylinder head, thus making it possible to enclose the valve gear completely.

A Lamp of Compact Design for the Railroad Inspector

THE Union Carbide Sales Company, 30 East Forty-Second street, New York, is exhibiting a lamp which has recently been developed for service in railroad inspection work, car checking, etc. This lamp, known as the Model A, has been designed with the object of providing greater compactness and greater convenience for the workman. This was accomplished by lowering the burner and lens. It is considered by many users that the design of the Model A lamp is also improved in appearance over earlier models. In the new design, the water capacity has been considerably increased so as to provide a supply for eight-hour service.

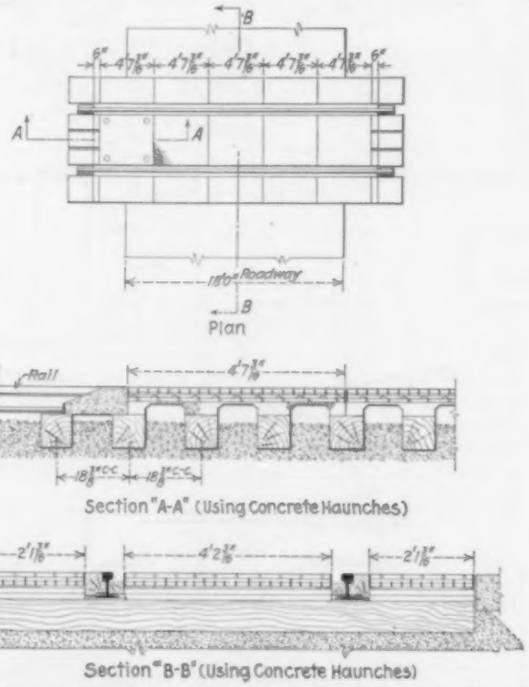


The Model A Carbide Lamp for Inspectors

The former model only had a capacity for four-hour service. The total height of the Model A lamp is 10½ in., diameter of the base, 6½ in., diameter of the lens, 6½ in. and height, excluding the handle, 6½ in. The lamp projects a light so that objects at a distance of 200 ft. can be easily identified. The working principle of the new model is substantially the same as that of earlier models.

The Irving Railroad Crossing Slabs

THE Irving Iron Works Company, Long Island City, New York, is exhibiting an adaptation of the Irvico type of mesh flooring for use as reinforcement and armor for concrete slab construction, particularly for pre-cast concrete slabs for railroad crossings. The construction provides a skeleton reinforcement for strength, coupled with a steel mesh surface armoring all in one panel, which lends itself readily to pre-casting in quantity in the railroad yard and delivery to any site on



Plan View and Cross-Sections Showing the Construction of the Irving Safcross Unified Panel Concrete Slabs

the line for new highway crossing construction repairs. When a grade crossing is eliminated, these slabs can be transferred to another crossing.

Adjustable Switch Lamp Socket

THE Dressel Railway Lamp & Signal Company, Arlington, N. J., is exhibiting an adjustable switch-lamp socket by means of which adjustment may be made for even the most extreme cases of a crooked stub. Even if the appearance of a crooked switch lamp is not considered, its efficiency is greatly impaired. If the lamp is not vertical, the best burner will smoke and, in a short time, a thick crust will cover the glass chimney and ultimately the lenses. This renders the light more or less invisible, in some cases entirely shutting off the light. The adjustment is done by a wrench. The lamp socket has no delicate parts to get out of order. It consists of the two parts, the outer and the inner socket, but between these two pieces are sandwiched two wedge-shaped circular discs. All four parts are held in position by two bolts.

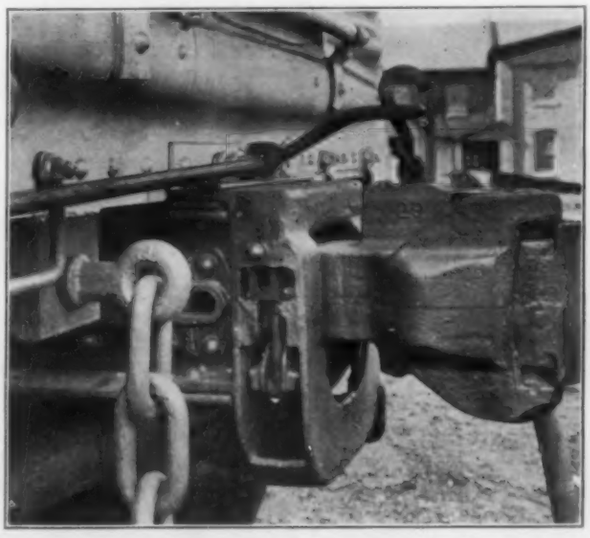
When the switch lamp is mounted on the stub, the two nuts are loosened and the discs are turned into position when the lamp is vertical. The nuts are fastened again and the lamp can now be removed and replaced on the same stub without any interference with the adjustment. The turning of the discs is done by tapping the projections with the wrench. As the discs can be turned to any position, the adjustment can be made to compensate for inclinations in any direction.

A Switch Lamp Mounted on an Adjustable Socket

Centering Device for Swivel-butt Couplers

THE Union Metal Products Company, 310 South Michigan avenue, Chicago, is exhibiting its redesigned centering device for use with swivel-butt couplers. Comparatively little change was needed to adopt the principle of the centering device to the swivel-butt coupler.

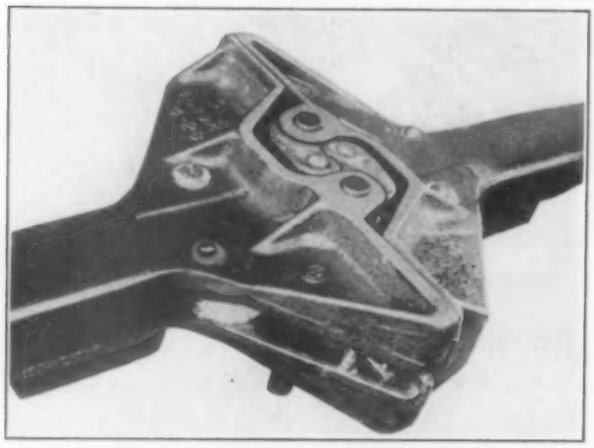
The device retains the swinging carry iron, supported on drop-forged links, which, in turn, are hung from pockets cast in the striking casting. The integral bottom tie remains the same, except that it is cut away lower so as to admit the larger butt of the new type coupler.



The Union Centering Device Applied to a Swivel-Butt Coupler

A Tight-Lock Coupler Which Works With A. R. A. Type

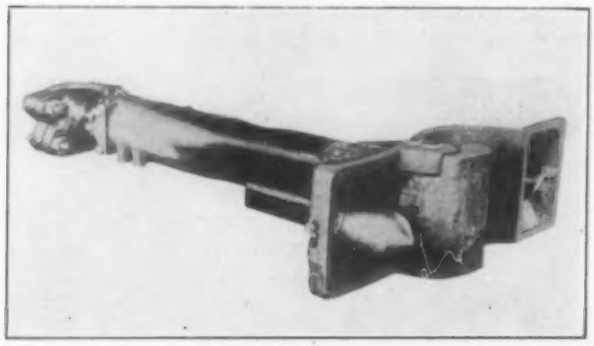
AN automatic car coupler designed to produce an immovable connection between coupler heads when coupled, has recently been developed and is being



A Tight-lock Coupling

exhibited by the Ohio Brass Company, Mansfield, Ohio. This coupler, known as the O-B Tomlinson coupler, is an adaptation of the tight-lock principle of the Miller hook couplers which this company has supplies extensively for electric railway rolling stock for some years. To provide for coupling interchangeably with standard A. R. A. couplers, the Miller hook coupling head has been replaced by one having aligning and interlocking guard arms and a vertical plane knuckle of the Janney type.

The tight-lock feature is provided by lateral wings of the pin-and-funnel type on the coupler head, so de-

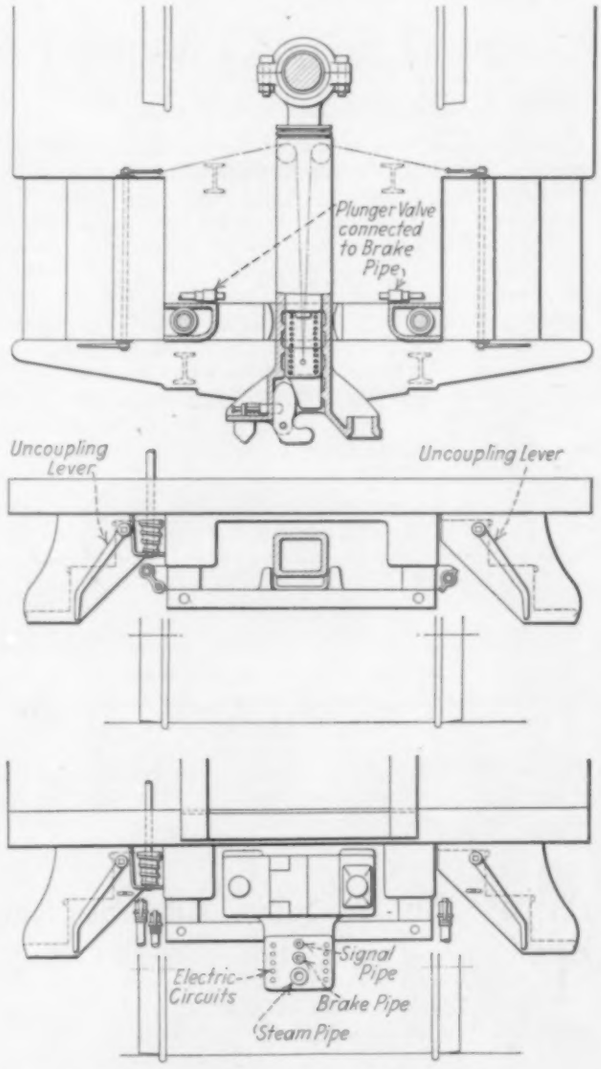


The Face of the Coupler

signed that, as the coupler knuckles engage the opposing guard-arm faces, the wings are brought into register. When the opposing faces of these wings are in closed contact, the pin-and-funnel connections hold the heads immovably aligned with respect to each other and the knuckles are locked by a spring-actuated wedge lock which moves forward in the coupler shank. The lock spring is proportioned so that its action is faster than the recoil of the mass of the car, even under collision shocks. The "making" of the coupling is thus assured under any conditions which bring adjoining coupler heads together, and the knuckles may therefore be left in the open position when not coupled.

Such a coupler provides a rigid drawbar connection between adjoining cars. Suitable provision must, therefore, be made for universal angular movement between the drawbar and the car body, as well as for some torsional movement between adjoining cars. This is provided for in a ball-and-socket anchorage to the underframe, a method of attachment thoroughly established in electric railway practice. The drawings show the relation of this anchorage to the center sills. In passenger cars, the stem of the anchorage is pressed into a circular hole bored in the extension of the platform casting, to which it may also be welded if desired.

The rear drawbar stem, on the end of which is the anchorage socket, extends forward into a coupler shank which is of barrel form. Surrounding this stem, inside

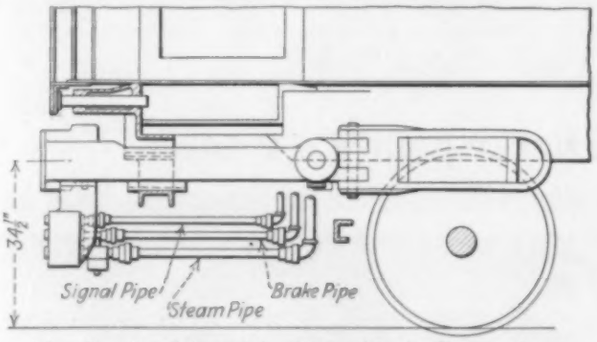


Plan and End Views of the O-B Tomlinson Passenger Car Coupler

the barrel, is the draft gear which may take several forms and which, in a friction type, it is said, can be provided up to 400,000 lb. capacity. A gland at the rear of the barrel is provided to make the barrel oil tight and a filling plug in the barrel permits the renewal of the lubricant, which is fed to the anchorage through a passage in the stem.

Two of these tight-lock couplers, when coupled, form a rigid draft member between the center sills of the two cars, which can be designed to provide a strength equal to that of the sills themselves. All coupler slack and

shocks incidental thereto are eliminated. Provision is made in the carrying members to permit the necessary lateral, vertical and torsional movement of this drawbar, but, in case of derailment or collision shocks, movements beyond the normal operating range are restrained. The drawbar then exerts a restraining influence up to

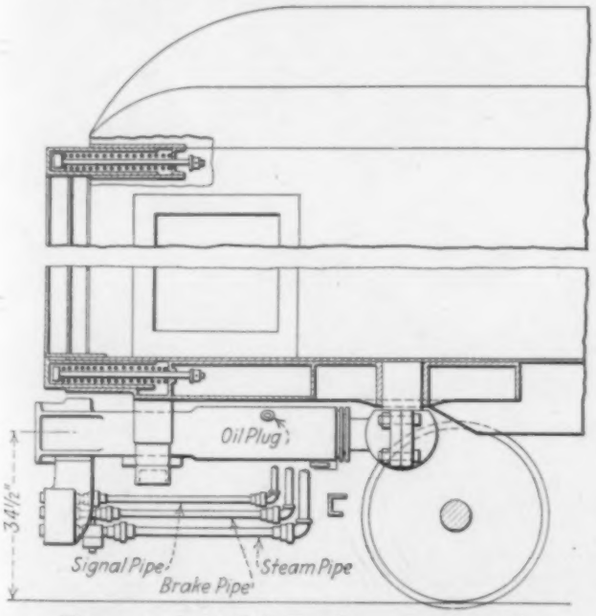


The Coupler Adapted for Use with the Conventional Yoke-type Draft Gear

its full strength to prevent telescoping, sandwiching, or overturning of individual cars in a derailed train.

This tendency of the cars in the train to remain coupled prevents the emergency application of the brakes in cases of derailments, split switches, etc., by the parting of the hose. At either side of the drawbar carrier is a plunger-type check valve piped to the brake pipe. Lateral movement of the drawbar beyond its full normal service range causes it to strike one of these check-valve stems and thus vent the brake pipe to cause an emergency application of the brakes.

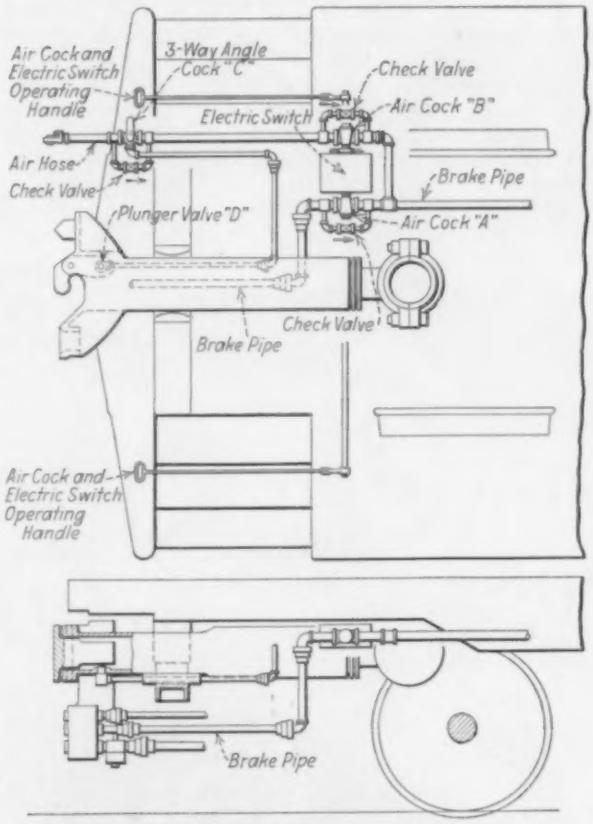
With the rigid alignment of the heads of the tight-



Elevation of the O-B Tomlinson Coupler with Ball-and-Socket Anchorage

lock couplers on impact, the coupler heads themselves become suitable supports for connector heads to carry both hose and electrical connections. For passenger service the connector blocks are designed to carry signal, brake-pipe and steam-heat ports, and a wide scope is provided for the arrangement of electric circuit contacts. Connectors of this type are extensively used for handling multiple-unit control circuits. Automatic coupling of 600-volt bus-line circuits has also been in successful operation with O-B Tomlinson couplers for many years in electric railway service.

One of the drawings shows the arrangement of brake-pipe connections where the automatic connector head is carried by the coupler, which has been worked out to make unnecessary the use of an adapter for interchange with cars fitted with the usual hose connections. The end of the brake-pipe is divided into two branches, one of which leads to the connector head and the other to the standard air hose. The latter is fitted with a three-way angle cock at the sill and, in addition, there is an air cock in each line. The two latter valves are interconnected and operated by the same handle so that when one is open the other is closed. The drawing shows



Arrangement of Air Brake Piping which Makes Train Operation Impossible with a Closed Angle Cock

an application for electrical connections in which the cut-out switch for the electrical leads to the connector is also operated by the air-cock handle.

Assuming that two cars are to be coupled and the knuckles are open—the normal position of the knuckles when uncoupled—cock *A* in the connector line is closed and cock *B* in the hose line is open, while angle cock *C* is closed. When closed, however, a by-pass connection, leading to a plunger valve *D* operated by the coupler knuckle, is open to the brake pipe back of the cock. With the knuckle open, plunger valve *D* is closed. When the car is coupled, the closing of the knuckle opens plunger valve *D*.

When the car is coupled to another fitted with the Tomlinson coupler and connector, as soon as air is turned into the brake pipe of the coupled car from the charged end of the train, it is led through the by-pass around air cock *A* into the brake pipe of the car and thence through the open air cock *B*, to blow through the plunger valve until the air-cock operating handle

is moved to close air cock *B* and open air cock *A*. On the other hand, if the car has been coupled to one with an A. R. A. coupler and brake-pipe hose connection, as soon as air is turned onto the brake pipe, the by-pass around angle cock *C* permits the escape of air through the plunger valve *D* until the angle cock is opened. With this equipment, therefore, the proper position of the valves is insured because plunger valve *D* continues to discharge air from the brake pipe until the proper position has been effected. A closing of any angle cock or the turning of any air cock from its correct position after the train is in operation immediately applies the brakes and thus prevents loss of braking power from this cause at any time without an effective warning by the emergency application of the brakes.

In interchange with standard A. R. A. type couplers, the coupling and uncoupling operations are the same as with the standard coupler. When coupling cars, both of which are fitted with tight-lock couplers and connectors, the only operation necessary is to open the brake-pipe cut-out cock, which is closed when the cars are uncoupled.

Several applications of the O-B Tomlinson coupler, other than that described here in detail, have been worked out. One of these is the design of a coupler shank connection for use with the standard yoke type of draft gear attachment for use on passenger equipment, and others are applications for freight cars using standard types of draft gears. A special design of passenger-car buffer and diaphragm has also been developed to take full advantage of the tight-lock coupler in reducing noise and movement of the buffing member relative to the car body.

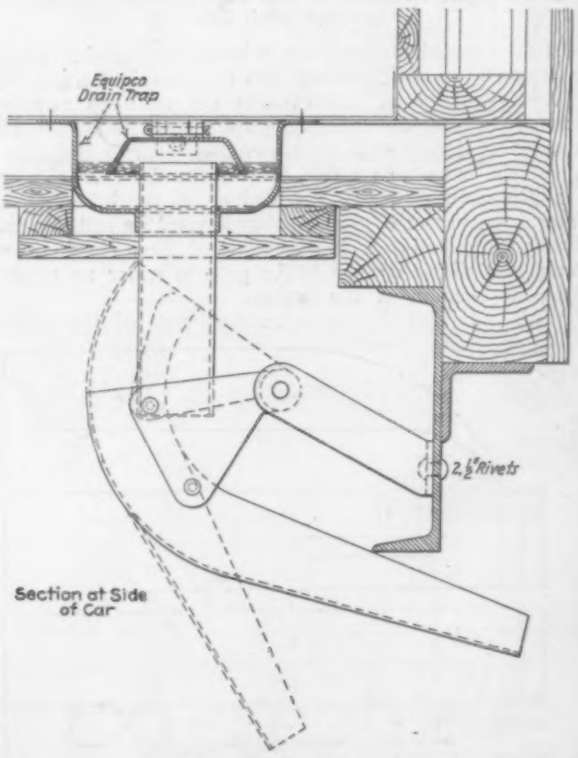
Klasing Wheel Type Safety Hand Brake

THE Klasing Car Brake Company, Railway Exchange building, Chicago, is exhibiting a wheel type safety hand brake, the mechanism of which is geared to provide a pull of about 4,000 lb. The braking effort is transmitted directly to the brake cylinder push rod. The upper brake unit is secured near the top of the car end with the wheel at a suitable distance above the brake step to allow the operator a clear and unobstructed view ahead of the car while using the brake mechanism. The set and release device is located on top of the mechanism housing just below the wheel. The device is convenient to the operator's hand.

The Klasing Wheel-Type Safety Hand Brake Applied to a Box Car

Drain Spout To Protect Trucks and Track

AMONG the exhibits of the Equipment Specialties Company, 310 South Michigan avenue, Chicago, is a drain spout designed to carry ice drippings clear of truck parts and the rails. The spout swings



Drain Spout Designed to Keep Drippings Off the Truck Parts and the Rails

in a bracket permanently fastened to the side sill and can be swung back to permit the inserting of a rod in the overflow pipe of the well trap for raising and lowering the cap. The raising and lowering of the cap is done from time to time to permit the cap to agitate any sediment or accumulation that might form in the bowl and tend to stop up the trap and flood the car floor. The spout swings back of its own accord to the correct position owing to the way it is balanced.

The spout and bracket are heavily galvanized and are of substantial construction. The design of the bracket varies to suit the conditions of the car underframe. In some instances, the bracket acts as a stop in which case a counterweight is placed on the end of the spout. In other cases the side sill acts as a stop for the spout.